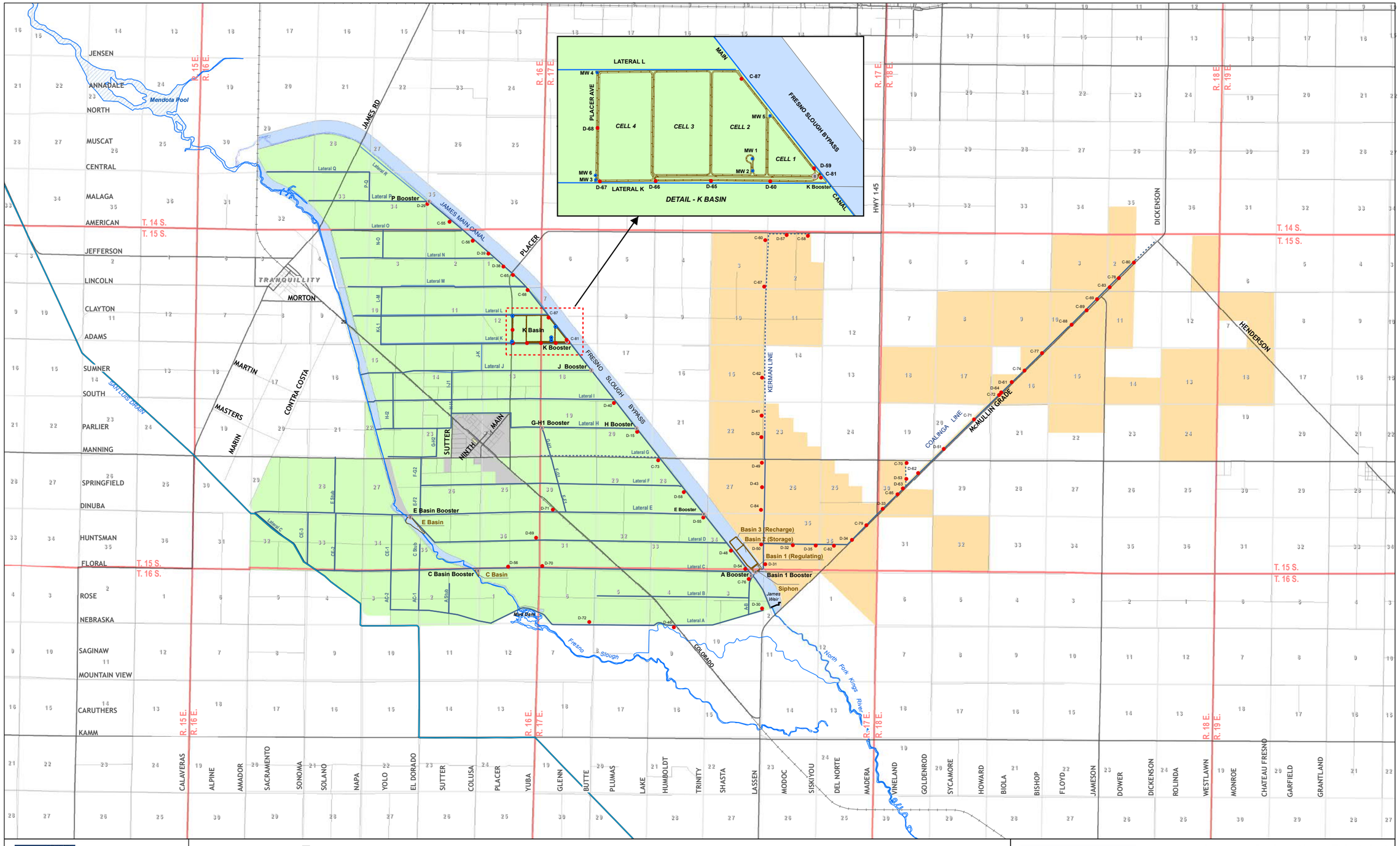
JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX A

DISTRICT LOCATION, FACILITIES AND SOILS MAPS



EST. 1958
PROVOST & PRITCHARD CONSULTING GROUP
An Employee Owned Company
286 W. Cromwell Ave.
Fresno, CA 93711-6162
(559) 449-2700

0 2,000 4,000 6,000 Feet

MAJOR ROAD
STREET
RAILROAD
TOWNSHIP/RANGE
SECTION
CITY OF SAN JOAQUIN
JAMES ID
CITY OF SAN JOAQUIN/JID OVERLAP
RECLAMATION DISTRICT 1606
JAMES ID WELL FIELD
CANAL
PIPELINE
BASIN
KINGS RIVER
BOOSTER
MONITOR WELL
PRODUCTION WELL

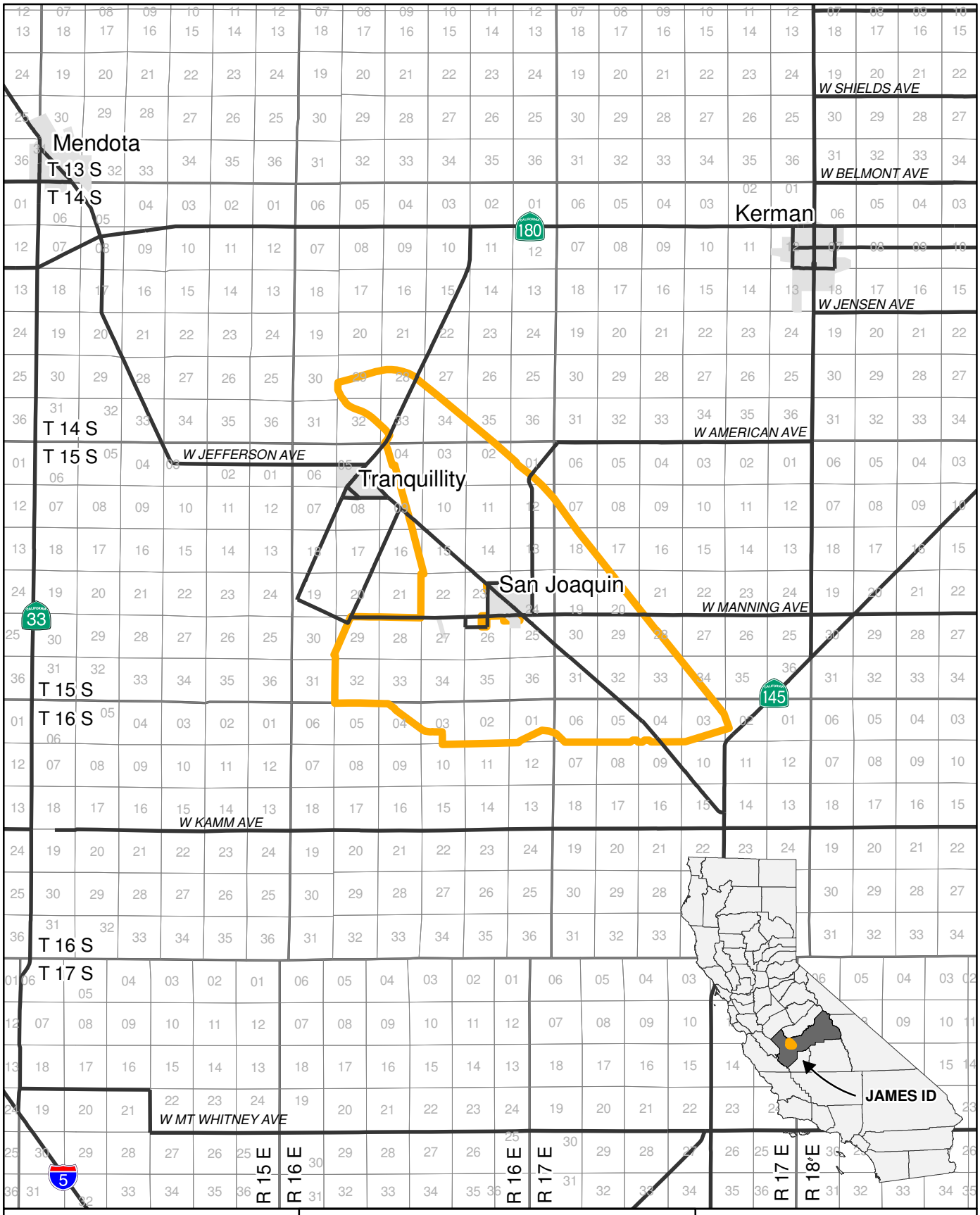
JAMES IRRIGATION DISTRICT
SAN JOAQUIN, CA

James Irrigation District

Fresno County, CA

April 2015

4/8/2015: \\evolution\clv_clients\Clients\James ID-1051\GIS\Map\JID_and_wellfield_24x36.mxd



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James Irrigation District

Location Map

FIGURE 1

NORTH
MUSCAT
CENTRAL
AMERICAN
AMERICAN
JEFFERSON
LINCOLN
CLAYTON
ADAMS
SUMNER
SOUTH
PARLIER
MANNING
SPRINGFIELD
DINUBA
HUNTSMAN
FLORAL
ROSE
NEBRASKA
SAGINAW

CALAVERAS
ALPINE
AMADOR
SACRAMENTO
SONOMA
SOLANO
NAPA
YOLO
EL DORADO
SUTTER
COLUSA
PLACER
YUBA
GLENN
BUTTE
PLUMAS
LAKE
HUNTER
TRINITY
SHASTA
LASSEN

Tranquillity
San Joaquin

A CLAY EXTENT
A CLAY EXTENT

A
B
D
E

*San Joaquin Valley Soils

Soil Texture

- Not rated or not available
- clay
- clay loam
- coarse sandy loam
- fine sandy loam
- loam
- loamy coarse sand
- loamy sand
- sandy loam
- silt loam

*Soils data is from NRCS Soils Survey, Eastern (CA654) and Western (CA653) Fresno County, reclassified by soils texture properties

0 0.5 1 1.5 Miles

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Legend

Geologic Layers From USGS Water Supply Paper 1999-H
Cross Section
A Clay Extent
James ID Wellfield
James Irrigation District
Street
Section

JAMES IRRIGATION DISTRICT
SAN JOAQUIN, CA

James Irrigation District

Top Soils and Locations of Subsurface Geologic Cross Sections and A Clay

11/17/2008 \\pineflat\dwg_dgn\Clients\James ID-1051\Projects\105108C1-AB303 Study\GIS\Map\soils_clay_crosssections.mxd

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX B

EVALUATION OF POTENTIAL DRAINAGE IMPACTED LANDS

James Irrigation District
Drainage Impacted Lands

The James Irrigation District (JID) is purported to be within a drainage problem area according to a September 1990 report entitled "*A Management Plan for Agricultural Subsurface Drainage Related Problems on the Westside San Joaquin Valley"*. This report claims that the westerly tip of JID is within the Westlands drainage problem subarea (see attached Figure). The report also provides recommendations for managing the drainage problems, including:

- Source control
- Land retirement
- Drainage water treatment
- Drainage water reuse
- Shallow groundwater pumping
- Evaporation ponds

JID disputes that they are in a drainage problem area, and, as a result, has not implemented any of these recommendations. JID has also performed groundwater level and groundwater quality investigations in the area, which are described below.

Groundwater Investigations

In 2008, the District received a grant from the California Department of Water Resources Local Groundwater Assistance Act (Assembly Bill 303) to further evaluate drainage problems in the District. Funds were used for monitoring well construction, water quality sampling, geologic analyses, and a review of historical water level and groundwater quality data. This work was completed in October 2010 and no evidence of drainage impacted lands was found in the District, even though a portion of JID was previously identified as a drainage problem area. Observations continue to suggest that District lands do not have drainage problems.

The attached Figure is a map showing the purported area that is 'drainage impacted' and the location of shallow monitoring wells in the area. Monitoring wells SW-1, SW-2 and SW-3 were constructed in 2010, largely to help assess the drainage problems in the area. The wells are 2-inch in diameter and were drilled to depths of 88 to 113 feet. The wells were originally planned to be shallower, but were constructed to about 15 feet below the existing groundwater level.

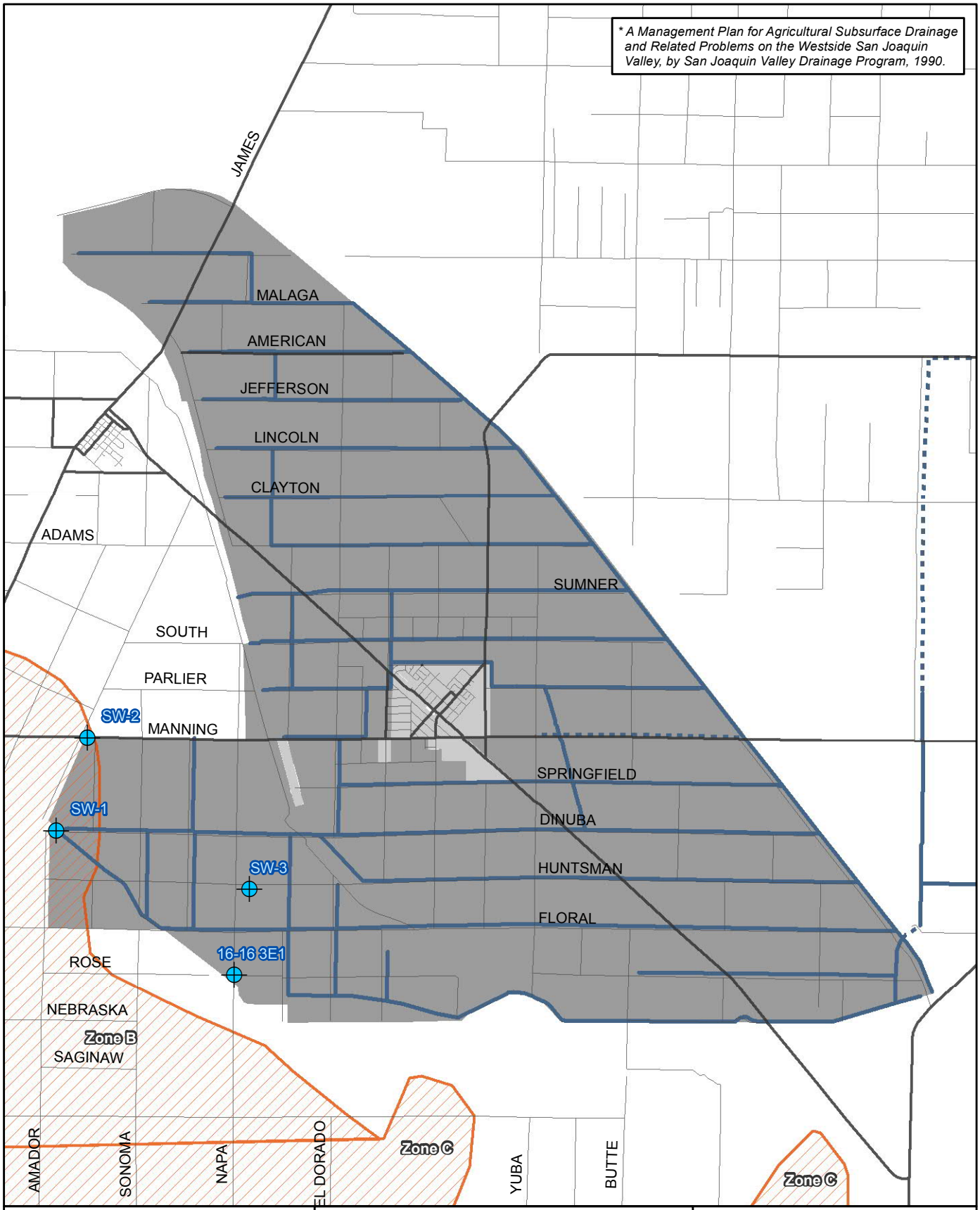
Table 1 shows groundwater levels in each of the shallow wells. Groundwater depths in the area have ranged from 70 to 95 feet since 2010, and have been dropping slightly. Drainage impacted lands typically have groundwater levels within ten feet of the ground surface. This data shows that the area is clearly not drainage impacted.

Table 1 – Shallow Groundwater Level Monitoring

Well	Date	Depth to Water (ft)
SW-1	10/15/2014	89.9
	4/28/2014	88.3
	10/17/2013	87.9
	3/5/2013	83.6
	10/15/2012	84.9
	4/23/2012	82.1
	4/10/2010	82
SW-2	10/15/2014	74.5
	4/28/2014	73.2
	10/17/2013	72.4
	3/5/2013	71.1
	10/15/2012	71.3
	4/23/2012	70.4
	4/10/2010	70
SW-3	10/15/2014	94.8
	4/28/2014	93.9
	10/21/2013	92.8
	3/14/2013	90.5
	10/15/2012	90.8
	4/23/2012	89
	4/10/2010	91

Groundwater quality was also tested in wells SW-1, SW-2, SW-3 and 16-16 3E1. The water quality in all of them was generally poor and not suitable for agriculture. Selenium was tested in SW-1, SW-2 and SW-3 but was not detected. Selenium is considered a general indicator for shallow drainage problems in the area.

Based on the data presented above, drainage is not a problem in JID and no drainage improvements have been implemented, as they do not appear to be needed. JID formally requests that they be removed from the list of Districts that have drainage impacted lands.



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James I.D.

Monitoring of Potential Drainage Impacted Lands

4/27/2015 : G:\James ID-1051\Projects\101515C3-Water Management Plan\GIS\Map\wells.mxd

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX C

JAMES IRRIGATION DISTRICT RULES AND REGULATIONS GOVERNING WATER DISTRIBUTION AND CANAL MAINTENANCE

JAMES IRRIGATION DISTRICT

RULES & REGULATIONS GOVERNING WATER DISTRIBUTION & CANAL MAINTENANCE

Originally Adopted 1920
Revised: February 24, 2010 to become effective April 1, 2010

Office Address
8749 Ninth Street
San Joaquin, California 93660

Mailing Address:
Post Office Box 757
San Joaquin, California 93660-0757

Telephone: (559) 693-4356
Facsimile: (559) 693-4357

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1 AUTHORIZATION

Section 22257 of the California Water Code states in part as follows: "Each District shall establish equitable rules for the distribution and use of water which shall be printed in convenient form for distribution in the District".

The Rules and Regulations set forth hereafter have been approved and adopted by the JAMES IRRIGATION DISTRICT Board of Directors and are intended to fulfill the requirements of Section 22257 of the California Water Code. Further, these Rules and Regulations cancel and supersede prior JAMES IRRIGATION DISTRICT Rules and Regulations. Refusal to comply with the requirements of or transgression of the stated Rules and Regulations may result in sanctions, including but not limited to denial of water service, being imposed by the District until full compliance has been made.

2 DEFINITIONS

The following definitions shall be applicable to these Rules and Regulations:

Agent	**Individual(s) granted Power of Attorney to act on behalf of the Landowner or Water User. Such individual(s) must file a copy of the Power of Attorney with the District. Forms are available at the District office.**
Board	**The Board of Directors of the James Irrigation District**
Bureau	**United States Department of the Interior, Bureau of Reclamation**
District	**James Irrigation District**
Water User	**The individual or entity who either owns or leases property within the District and makes application with the District for water service and is responsible for ordering, controlling, using and paying for water received from the District**
Year	**A calendar year, that is January 1 through December 31**

3 CONTROL OF THE SYSTEM

All matters relating to the distribution of water and the maintenance of the District's canals, ditches and conduits shall be under the general supervision of the Manager acting under the authority and direction of the Board of Directors.

4 OWNERSHIP OF CANAL SYSTEM

Certain diversion works, canals, and conduits, head gates and other structures and associated rights-of-way owned by the JAMES IRRIGATION DISTRICT were acquired by virtue of deeds from the San Joaquin Valley Farm Lands Company and others. Other facilities and rights-of-way were acquired by prescriptive use, grants, and various forms of conveyance agreements. All are dedicated to public use and are under the exclusive control of the elected Board of Directors acting through the Manager and staff of the District.

5 DELIVERY OF WATER

5.1 District Water Supply - General

The District sells water as a commodity only and not as a guaranteed service and will not be liable for defective quality of water, shortage of water, either temporary or permanent, or for failure to deliver water or delay in doing so.

The District's water supply is in a raw, untreated condition, and as a result, is considered to be unfit for human consumption without treatment. The District does not warrant the quality of water delivered and is under no obligation to construct or furnish water treatment facilities or maintain or better the quality of water.

5.2 Applications

Each year by January 1, and in any event prior to placing orders for deliveries, Landowners and/or Water Users shall file on a form provided by the District, an "Application for Water" for the forthcoming year. Said Application shall contain the following:

5.2.1 Name and address of Water User

5.2.2 Telephone number of the Water User and telephone number of the local individuals who manage or irrigate the farm or distribute water.

5.2.3 Water Users will be required to provide the following information: Turnout delivery numbers, Assessor's parcel numbers associated with each turnout and the total irrigated acreage for each turnout.

5.2.4 Landowners leasing their ground must list their tenant(s) by turnout or Assessor's parcel number and the acreage being farmed by each Lessee.

5.2.5 Acknowledgment that the Water User has read the Rules & Regulations and that water service will only be provided in accordance with the terms of said Rules & Regulations.

5.3 Bureau Forms

The "Application for Water" must also be accompanied by the proper Bureau Certification or Verification forms for the forthcoming year (unless previously submitted). Such forms must be completed by the Landowner or their Agent, and where the property is leased, by the Lessee/Water User. No water will be delivered until the forms, properly completed, are in the District office. Forms may be obtained in the District office.

District staff will review the forms for completeness but are not responsible for errors not found. The District is not responsible for deliveries made to Landowners and Water Users filing forms with incorrect information or if no forms have been filed. The Landowners or their Agent and Water Users are responsible for filing timely and correct forms.

Additionally, crop information may be required. Agricultural water service shall not be provided to any Water User who fails to provide the District with crop information at the time(s) and in the form(s) required by the District.

5.4 Orders

Water deliveries under demand schedules shall be made on the basis of continuous and steady use of water during all days and nights, including holidays and Sundays. In order to prevent waste of water and prevent breaks, it is mandatory that every Water User notify the Superintendent or Assistant Superintendent when the delivery is/will be terminated. As a general policy, it is requested that orders for water be submitted 72 hours in advance of the requested delivery date due to power order requirements. Exceptions will be made on a case-by-case basis.

5.5 Cancellation of Orders

As circumstances may develop from time to time which may cause the need to cancel orders for water, the District will make every effort to adjust to these events. However, as a general policy, six (6) hours' advance notice should be given when an order needs to be canceled or rescheduled.

5.6 Shutoff

In the event a Water User fails to notify the District in advance of a water shutoff or a rescheduling of a water delivery, the Water User will be responsible for the water that is lost to the District as well as any property damage that may result from the failure to notify the District.

5.7 Coordination with Ditch tenders

Ditch tenders shall be assigned to operational areas within the District and shall have the responsibility of enforcing District Rules and Regulations and policies. The Superintendent shall be responsible for the coordination of Water User requests and will communicate those requests to the Ditch tender as they occur. Scheduled water deliveries to Water Users will be performed by Ditch tenders under the direction of the Superintendent. The Ditch tender will make every effort to maintain an adequate flow of water in each lateral canal to meet requested demands. However, changes in water use due to temperature variation, improper coordination by upstream users during water changes, local runoff from precipitation, spill water from other lateral systems, canal breaks, and other emergencies may cause unavoidable fluctuations and interruptions in flow. It is expected that a Water User will notify the Superintendent if water is not available when requested or if the flow is interfered with during the period. It is also expected that all Water Users will cooperate with the Superintendent and/or the Ditch tender in determining the cause of the interruptions and will, to the extent practical, assist in correcting the problem.

5.8 Water Allocation

The District will implement water allocations when necessary for equitable distribution of water as follows. The District has for many years allocated water and capacity on individual canals based on the acreage that has timely applied for water service that year, consistent with Water Code Section 22252.1, herein called "irrigated acreage."

5.8.1 Area Allocations

The conditions for determining allocations on an individual canal or area include, but are not limited to: power failure, equipment failure or any operational problem that would prevent the District from delivering water in a timely manner. The duration of allocations will be held to the minimum length of time required to return to normal operations and deliveries. Allocation amounts will be on a per-acre basis based on irrigated acreage over the affected area.

5.8.2 District-wide Allocation

If at any time the District has insufficient supplies to supply the demands of all Water Users then eligible for and requesting service, available supplies shall be allocated on a per-acre basis based on all irrigated acres in the District.

5.9 Temporary Reductions-Maintenance & Repairs

The District may temporarily discontinue water service or reduce the amount of water to be furnished for investigation, inspection, maintenance, repair or replacement of any of the District's facilities. The District will give the Water User notice in advance of such temporary discontinuance or reduction, except in case of an emergency, in which event no notice need be given. No liability shall accrue against the District or any of its officers, directors or employees for damage, direct or indirect, because of the failure to provide water as a result of system malfunctions, interruptions in service necessary to properly operate and maintain the water distribution system or other similar causes which are beyond the District's reasonable control.

In order to maintain the integrity of the water delivery system, the District performs inspection and repair of head gates and other structures on an annual basis. This inspection is automatic and is usually conducted after the irrigation season has ended.

5.9.1 Distribution System Structures

Should repair of irrigation facilities/structures that are an integral part of the District's distribution system be required resulting from ordinary wear-and-tear, repairs will be automatically undertaken and costs will be borne by the District. Major items, such as gate replacement or repairs resulting from Water User negligence will be discussed with the Landowner and/or Water User for authorization to proceed and costs will be billed to the Landowner or Water User, as appropriate.

5.9.2 Field Diversion Structures

Field diversion structures, or those facilities installed for the convenience of the Water User which are NOT an integral part of the District's distribution system, will be repaired by the District at the direction and with the expressed permission of the Water User. Repair costs will be billed to the Water User.

5.10 Failure to Take Delivery

If a Water User fails, neglects, or refuses to use water when scheduled, it shall not be a valid basis for claiming the right to use water until rescheduled and confirmed by the Superintendent or Assistant Superintendent. In the event a head gate is opened without being ordered or rescheduled, the District reserves the right to close and lock the head gate until the problem is corrected.

5.11 Measurements

All water will be measured by the District with meters installed, maintained, and calibrated by it and such measurements shall be final and conclusive.

5.12 Liability

The District will not be responsible for the control, carriage, handling, use, disposal or distribution of water delivered to Water User outside the facilities then being operated and maintained by the District. Water User does hereby indemnify and shall assume the defense of and hold harmless the District and its officers, agents and employees from any and all loss, damage, liability, claims, or causes of action of every nature whatsoever, for damage to or destruction of property, including the District's property, or for injury to or death of persons, in any manner arising out of or incidental to the control, carriage, handling, use, disposal, or distribution of water outside such District facilities. Furthermore, Water User shall hold the District harmless from any inadvertent damages resulting from the District's duties to maintain and operate its facilities, including the application of weed control chemicals in and along District canals.

5.13 Determination of Safe Operating Levels in Canals

The water level in any District canal, ditch or conduit shall not be raised to an unsafe height for the purpose of providing gravity service to high elevation lands or delivery facilities. The Superintendent or his/her designated representative shall determine the safe levels to which water may be raised for the purpose of providing gravity service. Diversions which jeopardize the safe operations of District facilities or interfere with service to others shall not be permitted.

6 REQUESTS FOR NEW WATER SERVICE

Water Users within the District who are not presently receiving water from the District's distribution system, but desire to do so, shall be required to provide the necessary facilities to transport the water from the District's system to their lands. Requests for new water service must be submitted to the Manager who will verify that no delinquencies exist.

7 CHARGES AND ASSESSMENTS[1]

7.1 Charges

7.1.1 Charges for agricultural water and other services shall be established by the Board of Directors. The water charges shall include District operation and maintenance costs and any other costs determined by the Board to be payable as part of the water charges, including components established for the payment of all or a portion of the District's annual repaying obligation to the United States. The water charges shall also include the applicable charges required pursuant to the Reclamation Reform Act of 1982 and associated Regulations. Water charges shall be adjusted retroactively to the extent required by Federal or State law or regulations.

[1] Board of Directors, 02/24/2010

7.1.2 **As a condition of the District continuing to furnish water, the Water User shall make all payments for water used and other related services, by the 20th day of the month following the month of service. When any deadline established herein falls on a Saturday, Sunday, or holiday, it shall be extended to the next working day. Payments must be received at the District office in San Joaquin by the applicable due date. Charges not paid by 5:00 p.m. on the applicable due date shall be delinquent.**

7.1.3 **On the day following the payment due date, a penalty of two percent (2%) shall be added to the delinquent account balance and thereafter delinquent accounts shall accrue a late penalty of two percent (2%) each month. Penalties shall not, however, accrue after the delinquent charges, together with applicable penalties have been added to, and become a part of, the annual assessment levied on the land by the District as provided in Section 7.2.3. All payments and credits shall be applied to the earliest delinquent charges.**

7.1.4 **On the day following that in which an account becomes delinquent, all services for such lands for which payments are delinquent shall be discontinued, and services shall not be reinitiated until such delinquency is paid in full, plus applicable penalties and interest. Any outstanding orders for water for delinquent lands will be canceled; orders currently running will be allowed to finish.**

7.1.5 **If the delinquency is not cleared by the first of the following month following the date it becomes delinquent, (1) services for such delinquent lands and other lands under the same account will be placed C.O.D. (Cash On Delivery) wherein all orders must be prepaid and (2) all payments will be required to be paid by cashiers check or money order for the following twelve (12).**

7.1.6 **If the delinquency is not cleared by November 1st, the charges for such delinquent lands will be added to the landowner's assessments and will constitute a lien on that real property as provided in Section 7.2.3.**

7.1.7 **Following attachment, services to delinquent lands and other lands owned or leased by some or all of the same principals will be placed C.O.D. January 1st through December 31st of the following year. Assessments with attached charges must be paid by cashiers check or money order.**

7.1.8 **Landowners wishing to be notified when their tenant(s) account(s) are past due, must submit a letter annually to the District requesting this service. Letters will be mailed no later than the 15th of the month following the delinquency date.**

7.1.9 **As an alternative to the procedure described in Section 7.2.3, or in addition thereto, the District may elect to file and record a Certificate of Unpaid Water Charges as provided in California Water Code Section 25806 or pursue other remedies available. This Certificate creates a lien in the amount of delinquent charges on any land owned by the Water User, irrespective of where the water was used.**

7.1.10 **The District shall also require advance payment and/or payment by cashier's check or money order when a Water User's account is determined, based on the payment history or other action of the Water User, to create a financial risk or hardship for the District or its Landowners and Water Users. Circumstances which constitute the basis for such a determination include, but are not limited to, the following: (1) instances of a Water User's check being returned unpaid, except where the Water User's bank provides evidence a check was returned because of a bank error, or (2) instances where a Water User whose account is delinquent has, in violation of District regulations, taken water from the District in an unauthorized manner.**

7.2 Assessments[2]

7.2.1 The Board of Directors shall annually levy an assessment as provided by law to, among other things, collect sufficient funds to a pay costs of the District not directly related to serving water to specific users, to pay a portion of costs associated with contracting with the United States for a water supply, recognizing groundwater level improvements and other benefits associated with importation of such supplies and to pay any other costs determined by the Board to be payable as part of the assessment.

7.2.2 District assessments will be considered delinquent if not received or postmarked on or before December 20 (first installment) and June 20 (second installment). If any of the dates of delinquency fall on a Saturday, Sunday or a state holiday, the assessment installment due on that date becomes delinquent at 5:00 p.m. on the next business day. Should the assessment installment become delinquent, penalties (first installment=10%; second installment=5%) and costs of $5.00 per parcel per delinquent installment will be added thereto as provided by law from the date the assessment installment becomes delinquent.

7.2.3 As authorized by Water Code Section 25806, at the time of the filing of the District's assessment book with the Tax Collector of the District, delinquent charges, together with applicable penalties, shall be added and become a part of the assessment levied by the District on the land which received the service. The District shall give the owner of the land notice of the anticipated amount(s) prior to addition to the assessment. The amounts so added shall become a lien on the land and impart notice therefor to all persons.

7.2.4 Service shall not be provided to any parcel of land for which the assessment is delinquent.

7.3 Returned Checks[3]

7.3.1 An administrative charge of $20.00 will be charged for all returned checks in addition to any bank or institutional charges that may have been billed to the District..

8 RIGHTS OF WAY

Rights-of-way and easements for canals and ditches owned by the District include the land actually occupied by the canal or ditch, and such land on both sides thereof, as is reasonably necessary for the maintenance and operation of such canals and ditches. Rights-of-way and easements for conduits (pipelines) which have been substituted for open canals and ditches owned by the District and which have been acquired either by voluntary agreement with the Landowner or by legal process have been recorded in Official Records of Fresno County, California.

9 ENCROACHMENTS

No trees, vines, shrubs, corrals, fences, buildings, bridges, or any other type of encroachment shall be planted or placed in, on, over or across any District canal, ditch, conduit or the right-of-way therefor except pursuant to specific written authority of the District Manager. Any such encroachment of an unusual or extraordinary nature shall be approved by the Board of Directors. Any unauthorized encroachment may be removed by the District at the expense of the encroacher.

[2] Board of Directors, 02/24/2010
[3] Board of Directors, 02/24/2010

10 ACCESS TO LANDS

The authorized agents and employees of the District shall have reasonable access at all times to all lands irrigated from the District's distribution system for the purpose of maintaining, operating, or inspecting the canals, ditches, and conduits and the flow of water therein and for the purpose of ascertaining the acreage of crops of lands irrigated or to be irrigated. If the District holds a right-of-way or easement across private land for the operation and maintenance of a canal, conduit or other facilities, the District shall have the right to enter upon the property on which the right-of-way or easement is located to make repairs and do such things reasonably necessary for the full exercise of the easement rights.

11 WELL MEASUREMENTS

If requested, Landowners and Water Users shall be expected to allow District employees to enter upon their property and measure the depth of water in their private wells for the purpose of determining the conditions of the groundwater within the District. Measurements in selected observation wells are made and recorded by District personnel.

12 TAMPERING WITH FACILITIES

Landowners or Water Users who, by opening, closing or otherwise interfering with regulating gates or devices, cause any fluctuations in the flow of water in the District's distribution system or cause any overflow, breaks or damage of any kind, shall be responsible to the District for the expense and damage caused thereby and may be liable to others that may be adversely affected. Where water control devices are regulated in accordance with specific instructions from an authorized District representative or in cases of an emergency nature when immediate adjustment or other corrective action will prevent overflows, breaks, crop loss or other property damage, the person making such adjustments or taking corrective action shall not be deemed to be in violation of this rule. Any such emergency action or adjustments shall be reported forthwith to the Superintendent or Assistant Superintendent.

13 DAMAGING FACILITIES

No person shall make an opening, cut, plow or disc down or otherwise damage or weaken any canal, ditch or conduit owned by the District without written approval of the Manager or his/her designated representative. Any such approvals to open, cut, plow or disc down or otherwise disturb any District canal, ditch or conduit shall contain requirements for the restoration of such canal, ditch, or conduit to its original condition or better. The District reserves the right to seek restoration and monetary damages as provided by law for any authorized damage done to its system.

14 UNAUTHORIZED INSTALLATION

No delivery gate, pipe, siphon or any other structure or device shall be installed or placed in any canal, ditch or conduit owned by the District without express written permission and must be in strict compliance with plans and specifications approved by the Manager or his/her designated representative. Any such structure or device installed on a District canal, ditch or conduit without approval may be removed by the District at the expense of the owner.

15 WATER USER RESPONSIBILITIES

Water Users who waste water delivered by the District, either willfully, carelessly or on account of defective or inadequate privately owned ditches, conduits, or structures, or because of inadequate preparation of the land for irrigation, may be refused further services until such conditions are remedied. Any waste or other improper use of water shall be reported to the Superintendent who will take appropriate action.

16 PERSONAL LIABILITY

Any person entering upon District property or District rights-of-way, does so at his/her own risk and assumes all risks associated therewith and by such action accepts the responsibility for any damage to District or private property resulting therefrom.

17 TRASH AND DEBRIS

No tires, trash, debris, litter, garbage, prunings, brush, grass, dairy waste, dead animals, herbicides, pesticides, or any other material which is offensive to the senses or injurious to health, or which pollutes or degrades the quality of water or which obstructs the flow of water, shall be placed, emptied, discharged, thrown, or be allowed to slide, flow, wash or be flown into any canal, ditch or conduit belonging to the District. All District employees shall promptly report any violations of this rule to the District's Superintendent who will take appropriate action. The District reserves the right to take appropriate legal action and seek restitution in incidents of this nature.

18 DISCHARGES INTO CANALS

No person, firm, company, corporation or agency shall be permitted to pump, siphon, or drain surplus irrigation water (tailwater), storm water, waste water, or any other water, including but not limited to well water, into any District canal, ditch, or conduit, without the express written consent of the Board of Directors. Any such discharges which result in pollution or contamination of District facilities shall be immediately reported to the Superintendent for appropriate action.

19 IMPLEMENTATION OF AB 3030 GROUNDWATER MANAGEMENT PLAN WATER TRANSFERS

19.1 Background (Based on Findings of Resolution 2001-02, Adopted April 10, 2001

19.1.1 Pursuant to Water Code Section 22257, the District has adopted "Rules and Regulations Governing Water Distribution and Canal Maintenance," as amended, which Rules and Regulations do not provide for transfers of the District's surface water supplies outside of the District.

19.1.2 The District has adopted a Groundwater Management Plan pursuant to Water Code Section 10750, et seq. (referred to as A.B. 3030), dated March 20, 1996, amended February 13, 2001, ("Amended 3030 Plan") which, among other things, finds that groundwater overdraft within the District is approximately 1,600 acre-feet per year and an additional 2,700 acre-feet per year in the east side well field pumping area, which may not fully account for deficiencies expected to continue to occur as a result of actions by principally federal regulatory agencies affecting the ability of the District to receive supplemental water from the United States pursuant to its "Contract Between the United States of America and the James Irrigation District Providing for Water Service and for Adjustment and Settlement of Certain Claimed Water Rights" ("Water Supply Contract"). Therefore, the estimated long-term overdraft is now in excess of 3,700 acre-feet per year. Such Amended 3030 Plan further finds (p. 30):

> **"As stated earlier, any increase in groundwater pumping would exacerbate the continuing overdraft. Any transfer of surface water which is replaced by increased groundwater pumping would therefore exacerbate groundwater overdraft. Therefore, in order to prevent any further overdraft, the District will oppose transfer of surface water otherwise needed within the District except for temporary Landowner transfers of their annual allocation of CVP supplement supplies with the following mitigation measures:(I) the land in question will not be entitled to CVP supplemental surface water during the year when water is transferred. (ii) A Landowner transferring CVP water will be entitled to receive its allocation of groundwater and supplies of other than supplemental CVP supplies on the same basis as other lands within the District provided, that use of such supplies not increase as a result of such transfer. (iii) If the Landowner uses his/her own well or makes use of other private wells to substitute for the quantity of water transferred, the District will not provide the Landowner water from any source. The District may adopt rules and regulations to implement and carry out this mitigation measure."**

19.1.3 **Particularly in years of low precipitation and short water supplies, the District may receive requests from Water Users wishing to transfer a portion of the District's surface water supplies which would otherwise be allocated to their lands for use on other lands outside the District. It is in the best interest to accommodate such requests, provided that the resulting action does not adversely affect other Water Users within James or its groundwater resources.**

19.1.4 **If Water Users were permitted to transfer surface water to lands outside of the District and then replace that supply from groundwater extractions, either from their own wells or by groundwater supplied by the District, the resulting impact would be to further aggravate groundwater overdraft within the District, to the detriment of all Water Users within the District. Similarly, if a Water User were to pump groundwater within the District and export it, the same effect would occur.**

19.1.5 **By this supplemental policy, the District intends to prescribe conditions under which a Water User can transfer his/her allocated share of the District's supplemental water made available under its Water Supply Contract for use on lands within other contractors of the Central Valley Project. This policy shall be supplementary to the District's Rules & Regulations referenced in Section 19.1.1 and in furtherance of its Amended 3030 Plan.**

19.1.6 **To allow surface water transfers without the conditions imposed through this policy would result in adverse impacts to other Water Users within the District and possibly surrounding and would cause adverse impacts to groundwater conditions and further aggravate groundwater overdraft and thereby be a significant adverse impact on the environment. This Policy was adopted after due consideration to potential impacts on business activities, including agricultural operators, by permitting such transfers in such a manner so as to minimize adverse impacts on groundwater resources.**

19.2 **The District will permit a Water User to transfer his/her Allocated Share of Supplemental Water under the conditions prescribed following:**

> **"Allocated Share of Supplemental Water" is defined as: 35,300 acre-feet times the percentage allocation as determined by the Bureau of Reclamation times the number of acres for which the Water User has requested water service from the District divided by total number of acres in the District for which water service has been requested for such year.**

19.2.1 **The Water User shall fallow and not utilize any surface or groundwater to irrigate during such year on acreage which is equivalent to the quantity of water to be transferred, up to the Water User's Allocated Share of Supplemental Water times 2.58 (the average estimated consumptive use of water within the District), all to the satisfaction of the General Manager.**

19.2.2 **The Water User shall pay to the District a rate per acre-foot for each acre-foot transferred, that being the estimated fixed cost which otherwise will be incurred during such year based on the total acre-feet available for delivery by the District.**

19.2.3 **The Water User shall pay to the District the cost which the District pays to the Bureau for the supplemental water (one-half of which otherwise would be paid by other Kings River/Lower River interests).**

19.2.4 **The Water User obtains the consent of the District to which the water would be transferred, and the Bureau of Reclamation and otherwise complies with all rules and policies of the Bureau of Reclamation with respect to such transfer and pays any costs imposed by the Bureau of Reclamation to facilitate the transfer.**

19.3 **For any Water User within the District which attempts to pump groundwater and divert it directly into the Mendota Pool or into other facilities such that it can be transferred to lands outside the District, the District will only cooperate and consent to such transfer if, similar to condition 19.2.1 above, the Water User fallows to the satisfaction of the Manager acreage equivalent to the quantity of water pumped and exported divided by 2.58 feet per acre. Additionally, the Water User must comply with all applicable requirements of the San Luis & Delta-Mendota Water Authority, Bureau of Reclamation and the State Water Control Board, particularly related to pumping water into the Mendota Pool. Absent such Water User meeting**

these requirements, the District will object to and not approve any such attempted transfer and if the transfer is nonetheless implemented, the District shall reduce the quantity of water otherwise allocated to the Water User from any source by the amount of the objected to transfer in order to insure that such transfer does not cause adverse consequences upon the District's groundwater resources and its Water Users.

19.4 The Manager is authorized and directed to develop an application/agreement incorporating the above policy under which any Water User wishing to facilitate a transfer pursuant to this policy would agree to comply with its provisions. The Manager is authorized and directed to do all other things necessary and appropriate to carry out this policy in consultation with the District's consultants and to prevent any attempted transfers which are not consistent with this policy.

20 GROUNDWATER GENERALLY

As noted in Section 19, the District has for many decades carried out its conjunctive use project generally as provided in the AB 3030 Groundwater Management Plan. The following is noted:

20.1 Consistent with and as otherwise provided by Water Code Section 1005.4, a Landowner's use of water supplied by the District from a non-tributary source, is declared to be a reasonable beneficial use of groundwater and shall not result in any lapse, reduction or loss of groundwater rights.

20.2 In operating its Project, the District in part relies upon pumping groundwater through, (i) exercise of Landowners overlying groundwater rights, for the benefit of the District's overlying Landowners and (ii) exercising its right to pump groundwater provided for and recognized under a Deed granted to the District by the San Joaquin Valley Farm Lands Company, a corporation, dated April 22, 1920, recorded September 1, 1920, at Book 6, Page 1, et seq. of the Official Records of Fresno County, and the following additional recorded documents:

- **Grant Deed from Santa Ana and Fresno Land Company, dated September 16, 1991, recorded as Instrument No. 91122531;**
- **Grant Deed from Hubert Beene and Sons, dated November 8, 1991, recorded as Instrument No. 91139173;**
- **Grant Deed from Roy Rabb Ranches, Inc., and Georgia Rabb Ranches, Inc., dated October 4, 1991, recorded as Instrument No. 91155101; and**
- **Stipulation and Order dated October 13, 1993, executed on behalf of John Semper, Marlita M. Ferriera and Martin N. Semper, recorded December 30, 1993;**

All of said recordings being with the Fresno County Recorder's office.

20.3 Without obligating District to assume any responsibility therefore and without limiting or detracting from the obligations assumed by Water Users in this regard, District shall have the right to use of all seepage and return flow resulting from water which escapes, percolates, or is discharged beyond Water User's facilities, if any, and nothing contained herein shall be construed as an abandonment or relinquishment by District of the right to the recapture, use, and benefit of all such water.

20.4 In carrying out its conjunctive use project, the District may from time to time recharge, store and later recover imported water supplies on behalf of third parties.

21 DISPUTES

When Landowners/Water Users cannot resolve any dispute or controversies with any Ditch tender, the Superintendent or Assistant Superintendent, or any dispute concerning implementation of District policy with any employee of the District, or any other dispute concerning the District, the matter must be discussed with the Manager prior to asking the Board of Directors for final determination. Unresolved disputes must be presented in writing to the Board of Directors. The Board of Directors will take no action until a written complaint is received. The Board of Directors reserves the authority to act as the final level of appeal on any such dispute and controversy between Water Users and District employees.

STATE OF CALIFORNIA)
} ss.
COUNTY OF FRESNO)

I hereby certify that the foregoing Rules and Regulations were revised by the Board of Directors of the JAMES IRRIGATION DISTRICT at a Regular Meeting held February 24, 2010.

{SEAL}

Donna Y. Hanneman, Secretary
Board of Directors
JAMES IRRIGATION DISTRICT

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX D

DISTRICT SAMPLE CUSTOMER INVOICE

IRRIGATION INVOICE

JAMES IRRIGATION DISTRICT
P O BOX 757
SAN JOAQUIN CA 93660-0757
(559) 693-4356

Invoice Date: 4/30/2015

Customer Number:

Invoice Number:

SAMPLE INVOICE

Reference	Previous Balance	Payments	Balance Forward	2% Penalty	Usage	Rate	IRR Charges	Adjust. Qty	Adjust. Amount	Service ID Balance
A07E-131007	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
A07W-131008	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
A08-131009	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
A08N-131010	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
B05E-131615	5,650.40	5,650.40	0.00	0.00	40.33	112.000	4,516.96	0.00	0.00	4,516.96
B05W-131001	92,371.50	92,371.50	0.00	0.00	25.18	117.000	2,946.06	0.00	0.00	2,946.06
B12-131011	0.00	0.00	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
B14-131012	0.00	0.00	0.00	0.00	0.95	117.000	111.15	0.00	0.00	111.15
C02A-131632	3,442.88	3,442.88	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C03-131633	5,547.36	5,547.36	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C04-131634	4,365.76	4,365.76	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C10-131613	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C11-131612	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C12-131611	0.00	0.00	0.00	0.00	30.48	117.000	3,566.16	0.00	0.00	3,566.16
C13-131610	6,435.52	6,435.52	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
C15-131609	4,905.60	4,905.60	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D00-131608	5,475.68	5,475.68	0.00	0.00	45.98	112.000	5,149.76	0.00	0.00	5,149.76
D000-131641	6,938.29	6,938.29	0.00	0.00	64.67	112.000	7,243.04	0.00	0.00	7,243.04
D01-131631	5,035.52	5,035.52	0.00	0.00	29.60	112.000	3,315.20	0.00	0.00	3,315.20
D02-131003	2,860.77	2,860.77	0.00	0.00	18.81	117.000	2,200.77	0.00	0.00	2,200.77
D02A-131632	3,047.52	3,047.52	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D03-131004	0.00	0.00	0.00	0.00	0.00	114.480	0.00	0.00	0.00	0.00
D04-131604	5,289.66	5,289.66	0.00	0.00	21.14	114.480	2,420.11	0.00	0.00	2,420.11
D07-131006	702.00	702.00	0.00	0.00	37.31	117.000	4,365.27	0.00	0.00	4,365.27
D10-131622	2,784.60	2,784.60	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
D12-131002	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D13-131603	3,232.32	3,232.32	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
D14-131614	3,334.50	3,334.50	0.00	0.00	0.00	117.000	0.00	0.00	0.00	0.00
D15-131603	2,235.52	2,235.52	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
E09-131005	162.63	162.63	0.00	0.00	5.40	117.000	631.80	0.00	0.00	631.80
F05A-131639	194.22	194.22	0.00	0.00	4.18	117.000	489.06	0.00	0.00	489.06
MC04-131608	0.00	0.00	0.00	0.00	0.00	112.000	0.00	0.00	0.00	0.00
Account Totals:	164,012.25	164,012.25	0.00	0.00	324.03		36,955.34	0.00	0.00	**36,955.34**

Total Irrigation Charges ↑

2%/MO OR 24%/YR WILL BE APPLIED TO BALANCES UNPAID
AS OF 5 PM 20TH/MONTH - C.O.D. 1ST FOLLOWING MONTH

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX E

DISTRICT WATER INVENTORY TABLES

Year of Data	2014	**Enter data year here**

Table 1

Surface Water Supply

2014 Month	**Federal Ag Water** (acre-feet)	**Federal non-Ag Water.** (acre-feet)	**State Water** (acre-feet)	**Local Water (Riparian)** (acre-feet)	**Other Water** (acre-feet)	**Transfers into District** (acre-feet)	**Upslope Drain Water** (acre-feet)	**Total** (acre-feet)
Method								
January	0	0	0	0	0	0	0	0
February	0	0	0	0	29	0	0	29
March	0	0	0	0	23	0	0	23
April	0	0	0	0	27	0	0	27
May	0	0	0	739	108	0	0	847
June	0	0	0	3,799	63	0	0	3,862
July	0	0	0	1,278	1	0	0	1,279
August	0	0	0	256	9	0	0	265
September	0	0	0	128	13	0	0	141
October	0	0	0	0	8	0	0	8
November	0	0	0	0	7	0	0	7
December	0	0	0	0	0	0	0	0
TOTAL	0	0	0	6,200	288	0	0	6,488

Table 2

Ground Water Supply

2014 Month	District Groundwate (acre-feet)	Private Agric *(acre-feet)
Method		
January	3,079	0
February	6,209	0
March	6,283	0
April	6,752	0
May	10,078	0
June	10,118	0
July	8,561	0
August	6,584	0
September	4,564	0
October	1,913	0
November	1,368	0
December	0	0
TOTAL	65,509	0

*normally estimated

Table 3

Total Water Supply

2014 Month / Method	Surface Water Total (acre-feet)	District Groundwate (acre-feet)	Recycled M&I (acre-feet)	Total District (acre-feet)
January	0	3,079	0	3,079
February	29	6,209	0	6,238
March	23	6,283	0	6,306
April	27	6,752	0	6,779
May	847	10,078	0	10,925
June	3,862	10,118	0	13,980
July	1,279	8,561	0	9,840
August	265	6,584	0	6,849
September	141	4,564	0	4,705
October	8	1,913	0	1,921
November	7	1,368	0	1,375
December	0	0	0	0
TOTAL	6,488	65,509	0	71,997

*Recycled M&I Wastewater is treated urban wastewater that is used for agriculture.

2014 Precipitation Worksheet				
	inches precip	ft precip	acres	AF/Year
Jan	0.15	0.01		
Feb	0.89	0.07		
Mar	0.81	0.07		
Apr	0.30	0.03		
May	0.00	0.00		
Jun	0.00	0.00	See attached backup tables	
Jul	0.00	0.00		
Aug	0.00	0.00		
Sept	0.00	0.00		
Oct	1.00	0.08		
Nov	0.11	0.01		
Dec	2.63	0.22		
TOTAL	5.89	**0.49**		

2014 Evaporation Worksheet			
	inches evap	ft evap	acres
Jan	2.26	0.19	
Feb	2.54	0.21	
Mar	4.70	0.39	
Apr	6.82	0.57	
May	9.60	0.80	
Jun	10.42	0.87	See attached backup files
Jul	9.90	0.83	
Aug	9.01	0.75	
Sept	6.83	0.57	
Oct	5.18	0.43	
Nov	2.20	0.18	
Dec	1.30	0.11	
TOTAL	70.76	**5.90**	

Table 4

Agricultural Distribution System

2014 Canal, Pipeline, Lateral, Reservoir	**Length** (feet)	**Width** (feet)	**Surface Area** (square feet)	**Precipitatio** (acre-feet)	**Evaporation** (acre-feet)	**Spillage** (acre-feet)	**Seepage** (acre-feet)	**Total** (acre-feet)
Eastside Canal	81,840	25	2,046,000	8.4	239	0	0	(231)
Main Canal	44,880	55	2,468,400	15.4	328	0	6,270	(6,583)
Lateral A	49,632	50	2,481,600	10.2	290	0	970	(1,250)
Lateral B	14,256	50	712,800	2.9	83	0	328	(409)
Lateral C	66,000	47	3,102,000	12.8	363	0	622	(972)
Lateral D	31,152	48.9	1,523,333	6.3	178	0	378	(550)
Lateral E	47,520	50.7	2,409,264	9.9	282	0	390	(661)
Lateral F	29,568	52.7	1,558,234	6.4	182	0	335	(511)
Lateral G	16,896	54.6	922,522	3.8	108	0	281	(385)
Lateral H	31,680	53.7	1,701,216	7.0	199	0	372	(564)
Lateral I	27,456	52.9	1,452,422	6.0	170	80	351	(595)
Lateral J	23,760	52	1,235,520	5.1	144	42	307	(489)
Lateral K	23,760	52.8	1,254,528	5.2	147	0	276	(418)
Lateral L	20,592	53.6	1,103,731	4.5	129	0	189	(313)
Lateral M	16,368	54.3	888,782	3.7	104	0	178	(278)
Lateral N	16,368	52.8	864,230	3.6	101	0	174	(271)
Lateral O	15,840	49.4	782,496	3.2	92	0	185	(274)
Lateral P	13,728	47.4	650,707	2.7	76	0	142	(215)
Lateral Q	9,504	50	475,200	2.0	56	0	67	(120)
Lateral R	8,448	50	422,400	1.7	49	0	136	(184)
Reservoir No. 1	NA	NA	435,600	2.0	52.0	0	218	(268)
Reservoir C	NA	NA	130,680	1.0	16.0	0	65	(80)
K-Basin	NA	NA	1,089,000	0.0	0.0	0	0	0
Reservoir E	NA	NA	1,041,084	5.0	129.0	0	544	(668)
Mendota Pool[1]	0	0	0	0.0	0.0	538	0	(538)
TOTAL				128.7	3,517.1	660	12,778	(16,827)

1) Losses from Mendota Pool, which is just outside of the District, is 5%, based on an agreement with the Pool Operator.

2) K Basin is a groundwater recharge basin so seepage is not reported as a loss. Net precipitation and evaporation are negligible and are not reported.

Table 5

Crop Water Needs

2014 Crop Name	Area (crop acres)	Crop ET (AF/Ac)	Leaching Requiremen (AF/Ac)	Cultural Practices (AF/Ac)	Effective Precipitatio (AF/Ac)	Appl. Crop Water Use (acre-feet)
Corn (human use)	178	2.00	0.10	0.00	0.00	374
Cotton	4,224	2.23	0.05	0.00	0.00	9,631
Grain: Wheat	134	1.53	0.05	0.00	0.30	172
Hay: Alfalfa	108	4.83	0.20	0.00	0.40	500
Hay: Oats	361	1.53	0.02	0.00	0.30	451
Nuts: Almond Bearing	4,175	3.03	0.20	0.00	0.10	13,068
Pasture (Permanent)	9	4.83	0.20	0.00	0.40	42
Seed: Alfalfa	4,912	3.53	0.20	0.00	0.20	17,339
Seed: Lettuce	155	3.10	0.05	0.00	0.20	457
Pistachios	2,189	2.73	0.20	0.00	0.10	6,195
Onions: Dehydrated	1,917	2.67	0.10	0.00	0.10	5,118
Tomatoes: Canning	2,569	2.20	0.05	0.00	0.20	5,266
Grapes	2,376	2.13	0.10	0.00	0.10	5,061
Pomegranetes	444	3.38	0.20	0.00	0.20	1,502
All other crops	123	3.00	0.20	0.00	0.10	381
Crop Acres	23,874					65,557

Total Irrig. Acres 23,874 (If this number is larger than your known total, it may be due to double cropping)

Table 6

2014 District Water Inventory

Water Supply		Table 3		71,997
Riparian ET		(Distribution and Drain)	minus	0
Groundwater recharge		(intentional - ponds, injection)	minus	0
Seepage		Table 4	minus	12,778
Evaporation - Precipitation		Table 4	minus	3,388
Spillage		Table 4	minus	660
Transfers out of District			minus	0
Water Available for sale to customers				55,170
Actual Agricultural Water Sales	2014	From District Sales Records		55,987
Private Groundwater		Table 2	plus	0
Crop Water Needs		Table 5	minus	65,557
Drainwater outflow		(tail and tile, not recycled)	minus	0
Percolation from Agricultural Land		(calculated)		(9,570)
Unaccounted for Water		(calculated)		(817)

Table 7

Influence on Groundwater and Saline Sink

2014

Agric Land Deep Perc + Seepage + Recharge - Groundwater Pumping = District Influence	(52,731)
Estimated actual change in ground water storage, including natural recharge)	0
Irrigated Acres (from Table 5)	23,874
Irrigated acres over a perched water table	0
Irrigated acres draining to a saline sink	0
Portion of percolation from agri seeping to a perched water table	0
Portion of percolation from agri seeping to a saline sink	0
Portion of On-Farm Drain water flowing to a perched water table/saline sink	0
Portion of Dist. Sys. seep/leaks/spills to perched water table/saline sink	0
Total (AF) flowing to a perched water table and saline sink	0

Table 8

Annual Water Quantities Delivered Under Each Right or Contract

Year	Federal Ag Water (acre-feet)	Federal non-Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (Riparian) (acre-feet)	Other Water (acre-feet)	Transfers into District (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
2005	30,820	0	0	9,700	9,789	0	0	50,309
2006	23,866	0	0	9,700	33,840	0	0	67,406
2007	20,071	0	0	9,700	9,748	0	0	39,519
2008	6,212	0	0	9,700	5,345	0	0	21,257
2009	3,652	0	0	9,700	453	0	0	13,805
2010	16,528	0	0	9,700	1,711	0	0	27,939
2011	13,943	0	0	9,700	40,511	9,984	0	74,138
2012	19,729	0	0	9,700	1,288	4,796	0	35,513
2013	2,240	0	0	9,700	217	4,510	0	16,667
2014	0	0	0	6,200	288	0	0	6,488
Total	137,061	0	0	93,500	103,190	19,290	0	353,041
Average	13,706	0	0	9,350	10,319	1,929	0	35,304

JAMES IRRIGATION DISTRICT
5-Year Water Conservation Plan Update (2010-2014)
Canal Evaporation and Direct Precipitation
CIMIS San Joaquin Valley Westlands Station #105

				Lateral and Eastside Canal			Main Canal		
Year	Month	Effective Precip. (in)	Potential Evapotransp. (in)	Canal Use	Direct Precip. (in)	Canal Evap. (in)	Canal Use	Direct Precip. (in)	Canal Evap. (in)
2014	Jan	0.15	2.26	30%	0.05	0.68	100%	0.15	2.26
2014	Feb	0.89	2.54	100%	0.89	2.54	100%	0.89	2.54
2014	Mar	0.81	4.70	100%	0.81	4.70	100%	0.81	4.70
2014	Apr	0.30	6.82	100%	0.30	6.82	100%	0.30	6.82
2014	May	0.00	9.60	100%	0.00	9.60	100%	0.00	9.60
2014	Jun	0.00	10.42	100%	0.00	10.42	100%	0.00	10.42
2014	Jul	0.00	9.90	100%	0.00	9.90	100%	0.00	9.90
2014	Aug	0.00	9.01	100%	0.00	9.01	100%	0.00	9.01
2014	Sept	0.00	6.83	100%	0.00	6.83	100%	0.00	6.83
2014	Oct	1.00	5.18	10%	0.10	0.52	100%	1.00	5.18
2014	Nov	0.11	2.20	5%	0.01	0.11	100%	0.11	2.20
2014	Dec	2.63	1.30	0%	0.00	0.00	0%	0.00	0.00
	Total	5.89	70.76	-	2.15	61.13	-	3.26	69.46

JAMES IRRIGATION DISTRICT
5-Year Water Conservation Plan Update (2010-2014)
Canal Evaporation and Direct Precipitation Volumes

	Lats & E-side Canal	Main Canal
Year	**2014**	**2014**
Evaporation (in)	61.13	69.46
Precipitation (in)	2.15	3.26

									2014	
Canal	**Length (ft)**	**Top Width (ft)**	**Surface Area (Acres)**	**Surface Area (sf)**	**Water Depth (ft)**	**Side Slopes**	**Bottom Width (ft)**	**Volume (AF)**	**Evap. (AF)**	**Precip. (AF)**
Eastside Canal	81,840	25	46.97	2,046,000	6	2H:1V	9	237	239	8.4
Main Canal	44,880	55	56.67	2,468,400	6	2H:1V	39	315	328	15.4
Lateral A	49,632	50	56.97	2,481,600	6	2H:1V	34	314	290	10.2
Lateral B	14,256	50	16.36	712,800	6	2H:1V	34	90	83	2.9
Lateral C	66,000	47	71.21	3,102,000	6	2H:1V	31	391	363	12.8
Lateral D	31,152	48.9	34.97	1,523,333	6	2H:1V	32.9	193	178	6.3
Lateral E	47,520	50.7	55.31	2,409,264	6	2H:1V	34.7	306	282	9.9
Lateral F	29,568	52.7	35.77	1,558,234	6	2H:1V	36.7	198	182	6.4
Lateral G	16,896	54.6	21.18	922,522	6	2H:1V	38.6	118	108	3.8
Lateral H	31,680	53.7	39.05	1,701,216	6	2H:1V	37.7	217	199	7.0
Lateral I	27,456	52.9	33.34	1,452,422	6	2H:1V	36.9	185	170	6.0
Lateral J	23,760	52	28.36	1,235,520	6	2H:1V	36	157	144	5.1
Lateral K	23,760	52.8	28.80	1,254,528	6	2H:1V	36.8	160	147	5.2
Lateral L	20,592	53.6	25.34	1,103,731	6	2H:1V	37.6	141	129	4.5
Lateral M	16,368	54.3	20.40	888,782	6	2H:1V	38.3	113	104	3.7
Lateral N	16,368	52.8	19.84	864,230	6	2H:1V	36.8	110	101	3.6
Lateral O	15,840	49.4	17.96	782,496	6	2H:1V	33.4	99	92	3.2
Lateral P	13,728	47.4	14.94	650,707	6	2H:1V	31.4	82	76	2.7
Lateral Q	9,504	50	10.91	475,200	6	2H:1V	34	60	56	2.0
Lateral R	8,448	50	9.70	422,400	6	2H:1V	34	54	49	1.7
TOTAL	589,248	-	644	28,055,386	-	-	-	3,540	3,320	121

Notes: 1) Water depth and side slopes are assumed values
2) Widths for Eastside Canal, Main Canal, and Laterals A, B, Q and R are assumed values

JAMES IRRIGATION DISTRICT
5-Year Water Conservation Plan Update (2010-2014)
Regulation Reservoir Losses

Reservoir	Area (acres)
1	10
C	3
K-Basin Dist Canal and Cell No. 1	23.9
E	25

					Reservoir Use				Effective Precipitation (AF)				Evaporation (AF)				Seepage (AF)			
Year	Month	Effective Precip. (in)	Evporation (in)	Seepage (in/day)[2]	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E	Reservoir No. 1	Reservoir C	K-Basin Dist Canal and Cell No. 1	Reservoir E
2014	Jan	0.15	2.26	1.00	35%	35%	0%	35%	0.04	0.01	0.00	0.11	0.66	0.20	0.00	1.65	8.75	2.63	0.00	21.88
2014	Feb	0.89	2.54	1.00	100%	100%	0%	100%	0.74	0.22	0.00	1.85	2.12	0.64	0.00	5.29	25.00	7.50	0.00	62.50
2014	Mar	0.81	4.70	1.00	100%	100%	0%	100%	0.68	0.20	0.00	1.69	3.92	1.18	0.00	9.79	25.00	7.50	0.00	62.50
2014	Apr	0.30	6.82	1.00	100%	100%	0%	100%	0.25	0.08	0.00	0.63	5.68	1.71	0.00	14.21	25.00	7.50	0.00	62.50
2014	May	0.00	9.60	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	8.00	2.40	0.00	20.00	25.00	7.50	0.00	62.50
2014	Jun	0.00	10.42	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	8.68	2.61	0.00	21.71	25.00	7.50	0.00	62.50
2014	Jul	0.00	9.90	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	8.25	2.48	0.00	20.63	25.00	7.50	0.00	62.50
2014	Aug	0.00	9.01	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	7.51	2.25	0.00	18.77	25.00	7.50	0.00	62.50
2014	Sept	0.00	6.83	1.00	100%	100%	0%	100%	0.00	0.00	0.00	0.00	5.69	1.71	0.00	14.23	25.00	7.50	0.00	62.50
2014	Oct	1.00	5.18	1.00	25%	25%	0%	25%	0.21	0.06	0.00	0.52	1.08	0.32	0.00	2.70	6.25	1.88	0.00	15.63
2014	Nov	0.11	2.20	1.00	10%	10%	0%	10%	0.01	0.00	0.00	0.02	0.18	0.06	0.00	0.46	2.50	0.75	0.00	6.25
2014	Dec	2.63	1.30	1.00	0%	0%	0%	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	-	5.89	70.76	-	-	-	-	-	1.93	0.58	0.00	4.82	51.77	15.53	0.00	129.43	217.50	65.25	0.00	543.75

Notes
Seepage in Reservoir No. 1 was measured to be about 1-inch/day and is assumed to be similar in the other reservoirs

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX F

GROUNDWATER MANAGEMENT PLAN

GROUNDWATER MANAGEMENT PLAN

JAMES IRRIGATION DISTRICT AND THE CITY OF SAN JOAQUIN

NOVEMBER 2010

DATE SIGNED: 11/1/10

PREPARED BY:

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
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List of Abbreviations

AB	Assembly Bill
ACWA	Association of California Water Agencies
AF	Acre-feet
AWMC	Agricultural Water Management Council
bgs	below ground surface
BMO	Basin Management Objective
CVP	Central Valley Project
DBCP	dibromochloropropane
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EC	Electrical Conductivity
EPA	Environmental Protection Agency
ET	evapotranspiration
EWMP	Efficient Water Management Practices
FKC	Friant-Kern Canal
FWA	Friant Water Authority
FWUA	Friant Water Users Authority
GAC	Groundwater Advisory Committee
GMP	Groundwater Management Plan
GPS	Global Positioning System
HSA	Hydrologic Study Area
ID	Irrigation District
IRWMP	Integrated Regional Water Management Plan
JID	James Irrigation District
KRCD	Kings River Conservation District
KRWA	Kings River Water Association
MOU	Memorandum of Understanding
MVWD	Mid Valley Water District
NRCS	Natural Resources Conservation Service
RCWD	Raisin City Water District
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCIC	Stinson Canal and Irrigation Company
SCS	Soil Conservation Service
SLDMWA	San Luis and Delta-Mendota Water Authority
TDS	total dissolved solids
TID	Tranquillity Irrigation District
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WHPA	Wellhead Protection Area
WWD	Westlands Water District

1 - INTRODUCTION

This Groundwater Management Plan (GMP or Plan) is a joint effort between the City of San Joaquin (San Joaquin or City) and the James Irrigation District (JID or District). The two agencies are preparing this integrated GMP to better coordinate efforts, share data, and improve regional management of groundwater resources. Hereafter, the two agencies will be called the 'Plan Participants' and the area covered by the GMP will be called the 'Plan Area'. This Plan is the first effort by the City of San Joaquin to develop a GMP. This Plan is also an update to JID's GMP prepared in 2001, and this GMP satisfies new requirements for GMPs created by the September 2002 California State Senate Bill No. 1938, which amended Sections 10753 and 10795 of the California Water Code. This Plan also addresses recommended components for a Groundwater Management Plan described in Appendix C of Department of Water Resources Bulletin 118 (2003 Update).

1.1 - Background Information on Plan Participants

Following is general information on the Plan Area, followed by specific information on the City of San Joaquin and James Irrigation District.

Climate

The climate in the Plan Area is characterized by cool, mild winters and hot dry summers. Temperatures in the summer often exceed 100 degrees F. Fog occurs for long periods in the winter, with low temperatures typically in the mid 30's F; occasionally dropping into the 20's F. Average annual precipitation is about 7 inches, with 80 percent of the rainfall occurring from December through April. Precipitation is inadequate to meet crop water needs, except during the rainy season for some crops. Crops are sustained by irrigation during the summer. The growing season is typically 250 days per year.

Topography

Land in the Plan Area is relatively flat. It generally slopes westward and northward at a rate of about 3 to 4 feet per mile towards the topographic axis of the San Joaquin Valley, with local variations caused by remnants of slough channels. Elevations range from 160 to 180 feet above sea level.

City of San Joaquin

Below is a summary of the geography, demographics, water demands and water facilities in the City of San Joaquin.

Geography and Demographics

The City of San Joaquin was founded in 1920. The City is located in Western Fresno County about 11 miles southwest of the City of Kerman (see **Figure 1**). The City is an enclave in James Irrigation District. The City currently covers approximately 1 square mile. In 2010, the City had a population of 4,166. The population growth is expected to

be 2.6% per year for the next ten years. Most of the population is employed in the agricultural industry.

Currently, rural dwellings in JID are not commonly being built. Old houses are being torn down and people are moving to San Joaquin or other urban areas. This could lead to more growth in San Joaquin. San Joaquin plans to expand to the east with an area of about one square mile. Specifically, San Joaquin expects to see the construction of about 300 new homes in the next five years.

Water Demand

Water usage in San Joaquin from 2005 to 2009 is summarized in Table 1.1.

Table 1.1 – City of San Joaquin Water Usage

Year	Volume	
	Million gallons	Acre-feet
2005	222	681
2006	221	678
2007	242	742
2008	259	795
2009	257	789

In 2008, the City's per capita water usage was 181 gallons per capita per day (gpcpd), which is close to the national average (ConSol 2009). About 60% of the water is used for outdoor landscaping. Fluctuations in gpcpd from year to year can be explained by a variety of economic, demographic, and climate factors. The per capita water use is not expected to increase, but may reduce with the implementation of conservation measures.

Facilities

The City is serviced by three groundwater wells. Combined, these wells have a maximum capacity of 3,500 gallons per minute (gpm) and 5 million gallons per day (gpd). In 2008, 49% (1,723 gpm) of the maximum groundwater well capacity was used during peak consumption for the City. The City hopes to construct one well in the near future to replace one of the older existing wells. The City does not use or import any surface water. The City also operates three stormwater basins that provide stormwater retention and incidental groundwater recharge. The City has no recharge basins or reservoirs, but has plans to construct a reservoir tank within the next few years.

Based on current analysis, the City is not expected to outstrip its supply capacity or lose ability to meet peak demands over the next ten years, unless one of the wells ceases to operate. This is a concern for the City since some of their wells are old.

The City has about 950 service accounts. Residential accounts are not metered. About 5 percent of the accounts are commercial, and about 20% of the commercial accounts are metered.

James Irrigation District

Below is a brief description of the origin, physiography, geology, water supplies and facilities in JID.

Location

The James Irrigation District (JID or District) was organized in 1920 under the California Water Code. The District covers 26,392 acres wholly within Fresno County, California. The San Joaquin Valley Farmlands Company, successor to the James Ranch, granted to JID a perpetual right to pump and import groundwater from beneath lands east of the District, up to 200 cfs in capacity. This GMP covers the area within the JID boundaries and deeded groundwater area, but the physiography and geology of neighboring lands are also discussed. The District is situated in the central San Joaquin Valley of California and is approximately thirty miles southwest of the City of Fresno. The City of San Joaquin lies near the middle of the District, but is excluded from the District's boundary. State Highways 145, 180 and 33 are in close proximity. Adjacent agricultural water agencies include the Tranquility Irrigation District (TID), Westlands Water District (WWD), Stinson Canal and Irrigation Company (SCIC), Mid Valley Water District (MVWD), Reclamation District 1606, and the Raisin City Water District (RCWD). A location map for the District is included as **Figure 1**, and a vicinity map of the District within the Kings Groundwater Basin is included as **Figure 2**.

Land Use

When JID was formed in 1920, agricultural development of its lands was well underway. As irrigation facilities were constructed, use of the land gradually converted from grasslands to cultivated crop land. District lands are now essentially fully developed for agriculture. Cropping data for 1993 to 2007 is included on **Attachment 1**. Typically, about 23,000 acres are irrigated and prevalent crops include cotton, wine grapes, corn, almonds and seed alfalfa. Other significant crops include tomatoes, sugar beets, wheat, and onions. Currently, the principal irrigation method is furrow irrigation, with smaller amounts of drip, level basin, and micro-sprinkler irrigation. There is a trend towards planting permanent crops and converting to modern irrigation methods.

Facilities

Figure 3 is a map illustrating the major facilities in the District. JID's conveyance system consists of three major components: Eastside Canals, the Main Canal, and the Lateral Canals. The Eastside Canals consist of two canals, the Kerman Line Pump Canal (a.k.a. Lassen Canal) and the Coalinga Line Pump Canal (a.k.a. McMullin Grade Canal). These canals collect and convey groundwater pumped from about 35 JID wells, which lie outside of the District's boundaries, into the district. The Eastside Canals merge together and connect near the south end of the Main Canal by flowing through twin 60-inch diameter reinforced concrete pipelines that cross under the Fresno Slough

Bypass (also called the James Bypass). These 60-inch pipelines are called 'the siphon'. In 1992, 3.25 miles of the Eastside Canals were piped with smooth interior corrugated polyethylene pipe, and the remaining 12.25 miles were concrete lined; the pipeline and canal lining were financed through a DWR sponsored loan and JID bonds.

The JID Main Canal operates as a lift canal for surface water that is pumped from the Mendota Pool. Groundwater and diverted Kings River flood releases feed by gravity into the Main Canal from the south and flow northwesterly. The system also includes 17 lateral canals that are mostly unlined earthen ditches.

The District also has about 63 groundwater extraction wells and about 20 monitoring wells. A summary of well attributes is provided as **Attachment 2**. In 2004, JID completed construction of the 220-acre K-Basin Recharge Project. The project includes six wells to recover some of the recharged water.

The proposed JID Water Augmentation Project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. These facilities will be located just north of the James Weir in the Fresno Slough Bypass, about 3 miles southeast of the City of San Joaquin. It is estimated that the project will allow JID to capture and recharge an average of 4,740 AF/year of Kings River floodwater. Five recovery wells will have the capacity to extract 30 AF/day. Other details on the project are not provided as the design continues to evolve. The project is currently being permitted and designed, and construction is expected to be completed by the end of 2011 or possibly 2012.

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project. JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

Groundwater Supplies

The District owns and operates about 63 irrigation wells. The well locations are shown on **Figure 3**. About 28 of these are within the District boundary and about 35 are east of the District boundary within their deeded groundwater easement area. The current estimated yield for each well is shown on **Attachment 2**. Well yields range from 950 to 3,400 gpm, with an average of about 1,500 gpm. The total well pumping capacity is about 210 cfs. Most of JID's wells are between 500 and 600 feet deep, and extend to the top of the Corcoran Clay (a local confined aquifer). A few of JID's older wells are 700 to 900 feet deep and penetrate the confined aquifer. Two privately owned irrigation wells are inside of JID's boundary.

An enormous aquifer system lies beneath the Kings Groundwater Sub-basin and extends the length and breadth of the San Joaquin Valley. The valley is a broad structural trough, with the Sierra Nevada mountains on the east and the Coast Range mountains on the west. The Sierra basement rock extends from the foothills on the east, sloping downward to the southwest at 4^{o} - 6^{o}. Consolidated and unconsolidated continental and marine deposits from both the Sierra and the Coast Range mountains overlie this basement complex. Unconsolidated alluvial deposits make up most of the basin's freshwater aquifer (Croft, 1972).

Interspersed within the unconsolidated deposits that comprise the usable aquifer in the region are a number of clay layers that can act as confining beds. The confining bed that has greatest significance to the District is known as the Corcoran Clay, or E-clay. The E-clay underlies the entire District. Two other clay layers also partially underlie the District.

JID now primarily uses the unconfined aquifer lying above the E-clay. The top of this clay occurs at a depth of around 500 feet below ground level within the District. Originally, most District wells constructed in the 1910's and 20's tapped the aquifer below the E-clay. Many of these wells initially exhibited artesian flow.

Surface Water Supply

CVP Schedule 2 water (informally called 'Riparian water') is delivered without charge as a settlement of the District's water rights claims in Fresno Slough – during normal and wet years 9,700 acre-feet is available, during dry years 7,600 acre-feet is available. The contract requires that the District take delivery of this water according to a predetermined schedule. In practice, the United States Bureau of Reclamation has allowed some flexibility on when this water is taken.

In addition, JID has a Central Valley Project (CVP) contract (No. 14-06-200-700L) for up to 35,300 acre-feet of water each year. Other water used by the District includes spillwater from the Fresno Irrigation District and Kings River floodwater.

In the past during wet years the USBR has made surplus water available to JID, which is above its normal contract deliveries. The source of this water may be either imports from the Delta via the Delta Mendota Canal, or San Joaquin River flood releases (called Section 215 water by the USBR).

Water Demands

Water demand in the District slowly increased over the years as land was brought into production. Since full agricultural development has now occurred, change in demand is largely the result of changing cropping patterns. **Attachment 3** is a 2009 Water Delivery Report for JID. The table also provides general water supply data for 1994 to 2009. Between 1994 and 2009, JID pumped an average of 29,500 AF/year of groundwater (39% of total supply), and imported an average of 46,600 AF/year of surface water (61% of total

water supply). JID has a goal to reduce their overall water demands through water conservation and water management efforts.

For more general information on JID refer to the James Irrigation District Water Conservation Plan – 2009 Update.

1.2 - Goals and Objectives of Groundwater Management Plan

The overall purpose of this GMP is to develop a coordinated and comprehensive approach to the evaluation and management of groundwater resources within the City of San Joaquin, James Irrigation District, and the James Irrigation District "East Side Wellfield" which is outside the District boundaries. Specific goals of this plan include the following:

1. Develop a consensus among agency staff and stakeholders on the current groundwater conditions, need for proactive groundwater management, and problems that need to be addressed.
2. Document goals and objectives for sustaining existing efforts and improving groundwater management.
3. Develop practical solutions for addressing groundwater issues, especially groundwater overdraft.
4. Improve communication between the City of San Joaquin and JID, and increase awareness of each agencies groundwater management concerns, programs and goals.
5. Provide a realistic and feasible implementation plan for short-term and long-term groundwater management efforts.

This GMP documents the existing groundwater management efforts in the Plan Area and planned efforts to improve groundwater management. Specific groundwater management goals documented in this GMP include:

1. Preserve and enhance the existing quality of the area's groundwater.
2. Preclude surface or ground water exports that would reduce the long-term supply of groundwater.
3. Coordinate groundwater management efforts between regional water users.
4. Maintain local management of the groundwater resources.
5. Implement a groundwater-monitoring program to provide an "early warning" system to future problems.
6. Stabilize groundwater levels in order to minimize pumping costs and energy use, and provide groundwater reserves for use in droughts.
7. Maximize the use of surface water, including available flood water, for beneficial use.

In addition, the Plan Participants will take a proactive role in the legislative process, participate in developing sound legislation concerning groundwater management if it

becomes necessary, and take an active role in opposing any legislation that is detrimental to local groundwater management efforts.

1.3 - Statutory Authority for Groundwater Management

The City of San Joaquin and James Irrigation Districts are both public agencies with the authority to manage groundwater and prepare Groundwater Management Plans. California Assembly Bill 3030, as chaptered, (California Water Code, Division 6, Part 2.75, SEC. 10750-10753.9) grants specified "local agencies" authority to undertake groundwater management. AB 3030 also confers upon local agencies the powers of a water replenishment district. These authorities remained unchanged with the amendments to the law provided by California Senate Bill No. 1938, which was passed in 2002 and outlines additional requirements for GMPs. Agencies adopting a GMP are authorized to enter into agreements with other local agencies or private parties to manage mutual groundwater supplies, including those existing in overlapping areas.

1.4 - Lower Kings Basin Groundwater Management Plan

The Kings River Conservation District has developed a regional GMP that includes the area covered by James Irrigation District and the City of San Joaquin. The GMP is called the '*Lower Kings Basin Groundwater Management Plan*' (Regional GMP) and was prepared in April 2005. The GMP is compliant with Senate Bill 1938 and discusses regional geography, geology and hydrogeology, regional groundwater problems, and regional basin management objectives. The Regional GMP includes several study areas and JID and the City are included in study 'Area A'. One important goal in the Regional GMP is the development of an improvement district for all of Area A to jointly fund regional studies, projects and monitoring.

JID and the City did not participate in the development of the Regional GMP. However, JID found many of the goals and objectives in the regional GMP to be compatible with their needs and beneficial for JID and the region. As a result, JID passed a District Resolution (No. 2007-03) supporting the Regional GMP. As a result, JID will have two GMPs: this document and the Regional GMP. This document will help guide local and regional groundwater management, and the Lower Kings Basin GMP will help guide regional groundwater management.

1.5 - Groundwater Management Plan Components

This GMP includes the required and voluntary components for a GMP as identified in California Water Code Section 10753, et. seq. This Plan is also consistent with the recommended elements for a GMP as identified in DWR Bulletin 118 (2003), Appendix C. **Table 1.2** identifies the location within this document where each of the components is addressed.

Table 1.2 – Location of Groundwater Management Plan Components

Description	Plan Section(s)
California Water Code Mandatory Requirements (10750 et seq.)	
1. Documentation of public involvement	1.5, Appendix A
2. Groundwater basin management objectives	1.2, 3
3. Monitoring and management of groundwater elevations, groundwater quality, land subsidence, and surface water	5
4. Plan to involve other agencies located in the groundwater basin	4.3
5. Monitoring protocols	5.3
6. Map of groundwater basin and agencies overlying the basin	**Figure 2**
California Water Code Voluntary Components (10750 et seq.)	
7. Control of saline water intrusion	6.3
8. Identification and management of wellhead protection areas and recharge areas	6.2, 7.2
9. Regulation of the migration of contaminated groundwater	6.3, 6.4
10. Administration of well abandonment and well destruction program	6.1
11. Mitigation of overdraft conditions	7.1, 7.2
12. Replenishment of groundwater extracted by water users	7.2
13. Monitoring of groundwater levels and storage	5.1, 9.2
14. Facilitating conjunctive use operations	7.3
15. Identification of well construction policies	8.1
16. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	6.4, 7, 8.2
17. Development of relationships with state and federal regulatory agencies	4.2, 4.3
18. Review of land use plans and coordination with land use planning agencies	9.1
Additional Components Recommended by DWR (App. C of Bulletin 118)	
19. Advisory committee of stakeholders	4.1
20. Description of the area to be managed under the Plan	1.1, 2
21. Descriptions of actions to meet management objectives and how they will improve water reliability	4 - 9
22. Periodic groundwater reports	9.2
23. Periodic re-evaluation of Groundwater Management Plan	9.4

1.6 - Adoption of Plan

Refer to **Appendix A** for documentation on the adoption of the GMP and the public process that was followed.

Public Participation in Plan Development

The public was invited to participate in the development of the updated GMP through newspaper notices and public hearings described below.

Preparation of Integrated Plan with City and JID

JID began to update their GMP in 2009. JID contacted several local agencies to solicit their input on the GMP. The City of San Joaquin was the only agency that expressed interest in the local groundwater management, and requested that the two agencies prepare a joint integrated Groundwater Management Plan. In April 2010, the two agencies signed a Memorandum of Understanding to cooperate on local groundwater management (see **Appendix E**) and prepare a joint GMP.

Groundwater Advisory Committee

The City of San Joaquin and JID used their City Council and Board of Directors, respectively, as groundwater Advisory Committees during preparation of this GMP. The two agencies plan to form a joint GAC for implementing the GMP after it is adopted. The joint GAC will include representatives from JID and the City that can represent and speak for the local interests. Several special sessions on groundwater issues were held at JID Board of Directors and City Council meetings. The GAC were also given a draft copy of the GMP to review. The GAC provided several insightful and useful comments for managing groundwater that were incorporated into the GMP.

As required by the California Water Code Section 10753.2 (a), JID and the City published a series of public notices, held public meetings, and adopted resolutions required for preparing and adopting this GMP. No comments were received from the public other than those offered by the Groundwater Advisory Committees. These public outreach efforts are summarized in Table 1.3 below.

Table 1.3 – Public Participation in Groundwater Management Plan Adoption

Phase of Public Noticing	Description	James Irrigation District	City of San Joaquin
Intent to prepare GMP	Notice of hearing published	12-31-08/1-7-09	4-10/5-10
	Hearing held. Resolution adopted.	1-13-09	5-12-10
	Resolution published	4-8-09/4-15-09	7-7-20/7-14-09
GMP Adoption	Notice of hearing published	9-29-10/10-6-10	9-29-10/10-6-10
	Hearing held. Resolution adopted.	10-19-10	10-13-10

The hearing at JID was advertised for October 12, 2010, but JID was forced to reschedule their Board meeting to October 19, 2010. However, no one appeared at the JID office for the October 12 meeting, and no comments were received at the October 19 Board meeting.

2 - GEOLOGY AND HYDROGEOLOGY

This section discusses the geology and hydrogeology of the City of San Joaquin, JID, JID eastside well field, and the surrounding area. The purpose of this section is to provide general background information on the local geology, hydrogeology and water chemistry that will aid in selecting and implementing groundwater management programs. Most of the information in this section was derived from City of San Joaquin records, JID records, USGS Professional Paper 1401-C, USGS Water Supply Paper 1999-H, and a report prepared by the United States Bureau of Reclamation for Tranquillity Irrigation District.

The following sections include technical discussions on the plan area's groundwater. These are intended to provide geologists, engineers, and water managers a greater understanding of the area's stratigraphy, groundwater conditions, and hydrogeologic parameters. Less technical discussions on groundwater management programs are provided in Sections 3-9 of this document.

2.1 - Regional Geology

The San Joaquin Valley is the southern part of a large, northwest-to-southeast trending asymmetric trough of the Central Valley, which has been filled with up to six vertical miles of sediment. This sediment includes both marine and continental deposits ranging in age from Jurassic to Holocene (recent). The San Joaquin Valley lies between the Coast Ranges on the west, the Sierra Nevada on the east, and extends northwestward from the San Emigdo and Tehachapi Mountains to the Delta near the City of Stockton. The San Joaquin Valley is 250 miles long and 50 to 60 miles wide. The relatively flat alluvial floor is interrupted occasionally by low hills.

The San Joaquin Valley is divided into several geomorphic land types including dissected uplands, low alluvial fans and plains, river floodplains and channels, and overflow lands and lake bottoms. The alluvial plains cover most of the valley floor and comprise some of the most intensely developed agricultural lands in the San Joaquin Valley. In general, alluvial sediments of the western and southern parts of the San Joaquin Valley tend to have lower permeability than eastside deposits. The lower permeability in material along the western and southern portions of the valley is mainly attributed to the fine-grained nature of the parent material from which the alluvium is derived. The sediments are predominately marine in origin and consist of the thick sequences of mudstone, claystone, and siltstone that make up the Coast Ranges. Upon weathering and transport down slope along alluvial fans, these sediments readily decrepitate into fine-grained materials consisting mainly of silt and clay found along the axis of the valley trough.

Near the valley trough, fluvial deposits of the east and west sides grade into fine-grained deposits termed Flood-basin deposits by Page (1986) or Basin Sediments by USBR (1955). The San Joaquin Valley has several thick, fine-grained, lacustrine

deposits. The Corcoran Clay Member of the Tulare Formation is the most notable fine-grained deposit in the San Joaquin Valley affecting groundwater quality and creates confined groundwater conditions below. The Corcoran Clay was deposited about 600,000 years ago in the Tulare Lake. This clay bed, which is found in the western and southern portions of the valley, separates the upper semi-confined to unconfined aquifer from the lower confined aquifer. The clay bed covers approximately 5,000 square miles and is up to 160 feet thick beneath the present bed of Tulare Lake and thins with distance from the center of origin.

Regional Hydrogeologic Setting

An enormous aquifer system lies beneath the Kings Basin and extends the length and breadth of the San Joaquin Valley. The valley is a broad structural trough, with the Sierra Nevada Mountains on the east and the Coast Range mountains on the west. The Sierra basement rock extends from the foothills on the east, sloping downward to the southwest at 4^{o} - 6^{o}. Consolidated and unconsolidated continental and marine deposits from both the Sierra and the Coast Range mountains overlie this basement complex. Unconsolidated alluvial deposits make up most of the basin's freshwater aquifer (Croft, 1972).

Interspersed within the unconsolidated deposits that comprise the useable aquifer in the region are a number of clay layers that can act as confining beds or perching layers. The confining bed that has greatest significance to the Plan Area is known as the Corcoran Clay, or 'E' Clay. The 'E' Clay underlies the entire Plan Area (**Figure 5**). **Figure 9** is a generalized cross section of the Plan Area. Two other significant clay layers also partially underlie the Plan Area. However, neither the 'C' Clay on the extreme northern edge of the District, nor the 'A' Clay have as a significant impact on the Plan Participants use of the aquifer as the Corcoran clay. However, recent studies completed by JID for the K-Basin recharge project indicates that there, the ‘C’ Clay may be present, extending the ‘C’ Clay several miles southeast as mapped by USGS (1972).

JID wells primarily tap the unconfined aquifer lying above the 'E' Clay. The top of this clay occurs at a depth of around 500 feet below ground level within the District. Originally, most District wells constructed in the 1910's and 20's tapped the aquifer below the E-clay. Many of these wells initially exhibited artesian flow, reflecting the confined groundwater conditions below the Corcoran clay. The use of wells within District boundaries which tap the confined aquifer below the E-clay was slowly phased out due to its poorer water quality, generally lower yields, and more expensive well construction costs. However newer wells are constructed on a case by case basis, and built to recover the highest quality water at a given location, whether that is above or below the Corcoran clay. As a result, some wells tapping the confined aquifer are now constructed.

Groundwater in the plan area is divided into three separate non-marine, water bearing zones. These include the lower water-bearing zone, upper water-bearing zone, and the perched or shallow zone, as discussed below.

- The **lower water-bearing zone** contains fresh water in the lower section of the Tulare Formation from the base of the E-clay (Corcoran Clay) to the base of fresh water or the top of connate, saline marine water. USBR (1955) terms the base of the fresh water aquifer as the base of the effective ground-water reservoir. The depth to the base of fresh water is from about 1,000 feet to 1,400 feet beneath the Plan Area (Page, 1973).

- The **upper water-bearing zone** is from the top of the Corcoran Clay to the upper sections of the Tulare Formation, often considered the bottom of the A-clay.

- The **shallow or perched zone** underlies the portion of the Plan Area from the City of San Joaquin and northward, from the top of the A-clay, if it is present, to the perched groundwater table which is often within 10 feet or less of the ground surface. DWR Bulletin 118-03 uses 25 feet below ground surface (bgs) as a general vertical depth limit for the base of the perched zone.

Subsidence

Land subsidence in the San Joaquin Valley has been studied extensively in the past by the USGS and DWR. A State-Federal committee on subsidence was formed in the early 1950's and performed research and measured subsidence until 1970. By 1970, 5,200 square miles in the Valley had subsided more than 1 foot. Land subsidence of up to 16 feet has been experienced in the southern portions of the San Joaquin Valley basin. Between 1926 and 1970, a maximum of 29.7 feet of subsidence was measured at a point southwest of Mendota. The compacting forces caused by groundwater level decline squeezed more than 15.6 million AF of water storage space out of valley sediments during the same period.

There are two types of land subsidence due to groundwater withdrawals; elastic and inelastic. Elastic subsidence is not permanent and is largely reversible, if water levels recover to above historic lows. Recent studies indicate that current subsidence west of the plan area is primarily elastic in nature, and will likely not be inelastic until water levels fall below historic lows. Inelastic subsidence is permanent and occurs when water is removed from a confined aquifer for the first time, and is sometimes referred to as virgin subsidence. Between the mid-1920's to about 1980, the San Joaquin Valley experienced inelastic, non-recoverable subsidence.

The most recent reports on land subsidence in the San Joaquin Valley were completed by R. L. Ireland of the USGS in 1986 and Arvey A. Swanson of DWR in 1995. Ireland (1986) states that "*Land subsidence to groundwater withdrawal in the San Joaquin Valley that began in the mid-1920's and reached a maximum of 29.7 feet in 1981 has been halted by the importation of surface water through major canals and the California Aqueduct in the 1950's through 1970's*." This was generally true at the time, because large scale regional subsidence had halted, but smaller-scale local subsidence continued in many areas.

Poland et al. (1975) estimated that cumulative non-recoverable land subsidence from 1926 to 1972 in the vicinity of the Plan Area was on the order of 4 feet. A land subsidence contour map shows lowering of the land surface due to land subsidence was exacerbated west of the Plan Area and cumulatively, for the period of record, was as much as 8 feet in this area.

As land subsidence is a function of groundwater pumpage and recharge, it is linked to drops in groundwater levels. **Appendix C** shows hydrographs for wells monitored by DWR in the Plan Area. The DWR hydrographs show periodic increases in water levels, but the overall trend is a steady decline in water levels from the 1960's to today. Other hydrographs in the area prepared for KRCD's 2005 Lower Kings Basin Groundwater Management Plan Update and JID's 2001 GMP show continued decreases in water levels. Recent drops in groundwater levels are likely a result of low precipitation years, and the increased reliance on groundwater in the area to supplement surface water supplies.

Poland et al. (1975) show a direct correlation between subsidence and pumpage. In a 1996 draft memo, DWR indicated that from 1975 to 1992 subsidence occurred primarily in drought years when groundwater supplies replaced surface water supplies. The most recent record of land subsidence in the area is from Swanson (1995), were he indicates that 2 feet of subsidence occurred along the Outside Canal near Mendota Dam between the years of 1970 and 1994. However, it is not known how much of the 2 feet of subsidence reported by Swanson was residual subsidence, continued from pre-surface water delivery pumpage west of the Plan Area. Data from 6 extensometers located west of the Plan Area indicates that subsidence there has been elastic since about 1977.

With the recent reductions in surface water supplies for CVP contractors, the demand on the regional aquifer system's groundwater will likely increase. A link between land subsidence and pumpage is well established west of the District. Therefore, studies should be conducted to determine the susceptibility of subsurface deposits to land subsidence with increasing groundwater demand, especially if newly constructed wells tap the confined aquifer.

2.2 - Groundwater Basin

The James Irrigation District and City of San Joaquin are in the Kings Groundwater subbasin (Kings Basin) in the San Joaquin Valley Groundwater basin of the Tulare Lake Hydrologic Region (DWR 2003). See **Figure 2** for a map of the regional groundwater sub-basins. The Kings subbasin has been identified by the DWR as a basin with boundaries appropriate for ground water management purposes (DWR Bulletin 118-80). These boundaries were identified on the basis of geological and hydrological conditions, as well as political boundary lines. There are 19 court adjudicated basins in California, most of them in Southern California or coastal regions of California. The Kings Groundwater Subbasin is not included in the list of adjudicated basins, however DWR Bulletin 118-03

identifies eleven basins in California as being in critical conditions of over draft and the Kings Basin is included on the list.

Geography

The Kings Basin covers 976,000 acres. The Kings Basin extends from the Sierra Nevada foothills on the east to the San Joaquin Valley trough on the west, and from the San Joaquin River on the north to roughly the Fresno County line on the south. The Kings Basin also includes small portions of Kings and Tulare counties. The Plan Participants lie in the northwest portion of the Kings Basin and is bounded to the west by the southern extension of Delta-Mendota subbasin (**Figure 2**). The Westside Groundwater Subbasin borders the southwest portion of the District. The San Joaquin and Kings Rivers are the two principal rivers within or bordering the Kings Basin. There are no hydrogeologic features that would prevent groundwater from flowing between the Kings Basin to the Delta-Mendota or Westside Sub-basins, located to the west.

Tulare Lake Hydrologic Region

The Kings Basin (DWR subbasin No. 5-22.08) lies within the Tulare Lake Hydrologic Region, which covers approximately 10.9 million acres (17,000 square miles) and includes all of the Kings and Tulare Counties and most of Fresno and Kern Counties. The region has 12 distinct groundwater basins and 7 sub-basins of the San Joaquin Valley Groundwater Basin.

Groundwater has historically been important to both urban and agricultural uses, accounting for 41 percent of the Hydrologic Region's total annual supply and 35 percent of all groundwater use in the State. The aquifers are generally quite thick in the San Joaquin Valley subbasins with groundwater wells commonly exceeding 1,000 feet in depth. The base of fresh groundwater in the region, at an average of about 1,200 feet below ground surface, is considered to be the maximum effective depth of the basin in terms of pumping and recharge. According to Bullettin118-2003, well yields average 500 to 1500 gpm, with a maximum of 3,000 gpm (this agrees with data for JID wells).

Groundwater Quality for the Tulare Lake Hydrologic Region

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high total dissolved solids (TDS), nitrate, gross alpha, arsenic and organic compounds. The areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley, especially in water close to the surface, is the result of concentration of salts because of evaporation and poor drainage. According to DWR Bulletin 18-2003, TDS in groundwater in the Kings Basin ranges from 40 to 2,000 mg/L with an average of 200-700 mg/L. Groundwater quality specific to JID and the City of San Joaquin is discussed in detail in Section 2.6 below.

Groundwater Budget

According to the DWR Bulletin 118-03, in the Tulare Lake Hydrologic Region the San Joaquin Valley Basin only has two subbasins ranked as a Type "C" groundwater budget; Kings and Westside. A Type C budget indicates that there are not enough data to provide either an estimate of the basin's groundwater budget or groundwater extraction from the basin. This suggests a low level of knowledge exists on groundwater inflow, outflow, or storage information in the Kings basin. The C budget type is for the whole subbasin, not just the Plan Area, so it will take collaboration to get information needed to bring the subbasin to a budget type classification of A, which is based on actual groundwater budgets or models, or B which is a use-based estimate of groundwater extraction (using evapotranspiration demand). The Kings Subbasin was determined in DWR Bulletin 118-80 to be a "*critically overdrafted*" basin. This designation was not reevaluated when the bulletin was updated in 2003.

2.3 - Stratigraphy

The following discussion focuses on significant hydrogeologic units that have an impact on the groundwater resources within the Plan Area. From the surface to the base of the effective groundwater reservoir, about 1,200 feet bgs, important hydrogeologic units are topsoil, alluvial fan deposits of eastside origin, basin sediments, the A-, C-, and E-(Corcoran) clays, and alluvial deposits below the E clay, and to a lesser extent alluvial deposits of Westside origin. Depth to bedrock is too deep under the Plan Area to impact groundwater conditions and therefore will not be discussed here.

Topsoils

Soils in the District and vicinity range from coarse sands to heavy clays. In the middle and western portions of the Plan Area the soils generally have a higher clay content. These soils developed on sediments deposited in the valley trough during flood periods. The parent material of these soils is flood basin deposits and fine-grained alluvium of mixed granitic and sedimentary origin from both the Sierra Nevada and Coast Range Mountains. Soils in the eastern portion of the Plan Area and the JID eastside wellfield generally have higher sand content and are derived mostly from granitic Sierra Nevada sediments deposited on alluvial fans. The increase in sandier materials to the east extends into the subsurface and partially explains why more wells are located in the eastern side of JID than the western side. Soils throughout the vicinity of the Plan Area are stratified, with interspersed sandy and clayey streaks. **Figure 4** is a composite of United Stated Department of Agriculture soil survey maps which cover the Plan Area.

Subsurface Geology

The USBR (1955) provides the most focused and detailed descriptions of the subsurface geology in the Plan Area. While the USBR report was prepared for Tranquillity Irrigation District, it also covers the Plan Areas and east to R.17E/R.18E section line (approximately 2 miles east of the eastern JID border). The following discussion on subsurface geology is based on the descriptions found in USBR's report. Surface deposits, as mapped by the USBR, include eastside inactive alluvial fan deposits that cover the Plan Area east of James Bypass. From about the James Bypass

westward surface deposits are composed of Basin Sediments deposited in the axis of the valley during wet climatic cycles. Beneath these sediments lies the Corcoran clay, a regional lacustrine clay that causes confined groundwater conditions below it. Below the Corcoran clay, Sierran alluvial sediments dominate to depths greater than 3,000 feet bgs. These sediments are considered part of the Tulare Formation and are discussed in further detail below. Within the Tulare Formation seven lacustrine clays are mapped to varying extent in the San Joaquin Valley. In the Plan Area the A-clay, C-clay and E-clay or Corcoran clay are the most important of the mapped clay lacustrine clays. Several geologic cross sections passing through JID, the JID Eastside Wellfield, and the City of San Joaquin are included in **Appendix B**. The locations of the cross sections are shown on **Figure 4**.

Alluvial Fan Deposits of Eastside (Sierran) Origin

Surficial deposits of eastside origin are roughly found east of the James Bypass. The alluvial fan deposits above the Corcoran clay are predominately of eastside (Sierran) origin and comprise lenticular beds of sands and silts derived primarily from granitic rocks with rare clay laminae. These sediments probably represent deposits of former Kings River and San Joaquin River distributaries and are geographically higher than alluvium deposits of the active fans. They are slightly wind modified and soils that form on them tend to be saline; developed under conditions of high water table and little sedimentation. USDA-SCS soil classification for soils that formed on the inactive alluvial fans are sandy loam to fine sandy loam, with the finer grained soils dominating near James Bypass (**Figure 4**). Beneath the topsoil the sands vary from fine to medium-grained sizes and coarse sands and gravels are rare. The deposits generally become finer westward; grading into the Basin sediments discussed below. Fine-grained deposits dominate in the western portion of the area where they finger into the Basin sediments. This alluvial sequence occurs from the surface to depths of 500-550 feet bgs. Most of the wells in the JID eastside well field are completed in these deposits. These sediments, while all Sierran fluvial, represent three distinct environments of deposition. Clays and silt/clay mixtures represent deposition in lakes or marshes, well sorted sands and silts represent deposition in water with current such as streambeds or lake beaches, and poorly-sorted silt and clay fractions indicate floodplain origins.

Basin Sediments

West of the alluvial fan deposits of eastside origin (roughly James Bypass) surface deposits are comprised of Basin sediments. The Basin sediments are along the trough of the valley and consist of material of mixed Sierran and Coast Range origin. The Basin sediments are fine sands, silts, and clays. Soils that formed on the Basin Sediments are classified by the USDA-SCS as clay loam and clay. Under natural conditions these deposits are poorly drained, frequently flooded, and ponded or marshy. These sediments grade westward into inactive alluvial fan deposits of Westside (Coast Range) origin.

The A-clay is one of seven recognized lacustrine clay beds in the San Joaquin Valley (**Figure 6**). It was deposited in a widespread lake and is found almost continually beneath the topographic axis of the valley. While not comprised of alluvium of eastside origin or Basin Sediments, stratigraphically it is located within these units, and thus is discussed here. The top of it is often the base of the perched or shallow ground water zone. The A-clay, as mapped by Croft (1972), extends under the Plan Area from the City of San Joaquin northwestward (**Figures 6**). The base is about 60 to 75 feet beneath the land surface and generally it is between 5 to 70 feet thick. Structure contours drawn on the base of the A-clay indicate that it is relatively flat beneath the northern portions of JID. The A clay is an aquitard, not yielding significant water to wells, and in fact is a perching layer stopping the downward migration of water from the surface.

The C-clay is another of one of the seven recognized lacustrine clay beds in the San Joaquin Valley. In the JID area its extent is similar to the A-clay, but it was not mapped with the same level of certitude by Croft (1972) as the overlying A clay or the underlying E-clay. Recent subsurface investigations by JID for the K-Basin recharge project indicate that the C-clay is likely present there at a depth of 235 to 253 feet bgs. These depths correspond to Croft's mapping of the C clay where, in the northern portions of the District, it is roughly 240 to 260 feet bgs. The Report of Findings for Potential Banking Facilities (Provost and Pritchard, 2005) indicates that, based on the results of pump tests at the Lateral K Basin, there is only a small hydraulic connection between groundwater in strata above and below the C-clay.

Alluvial Deposits Beneath The Corcoran Clay

Beneath the Corcoran clay a series of granitic sands, silts, and occasional clays extends to depths greater than 1,200 feet. These sediments were deposited by alluvial fans debauching from the Sierra Nevada Mountains and resemble beds of similar origin above the Corcoran clay, but are texturally coarser grained. While most of the recently built wells, as of 2003, are completed in the alluvial deposits above the Corcoran, two wells built around 1950 were completed to depths below the Corcoran clay. Of these two wells one is abandoned and records indicate that the other is no longer in use. This unit contains the base of the effective groundwater reservoir, as described below. Water quality in this zone is discussed below but generally is of much better quality than water above the Corcoran clay. Currently the District designs and constructs wells based on site specific conditions and wells may be perforated above or below the Corcoran clay.

Corcoran Clay

The Corcoran Clay, also known as the E-clay, is a lacustrine clay bed of lake or swamp origin that effectively underlies the entire Plan Area. The Corcoran clay has long been recognized as the most significant subsurface deposit in the San Joaquin Valley confining water beneath it. It is the upper most boundary of the confined aquifer and the lower most boundary of the unconfined aquifer. The easterly extent of the E-Clay is shown on **Figure 5**. Structure contours drawn on the bottom show it to be about 560 to

620 feet beneath the surface in the plan area (Croft, 1972). Page (1986) provides structure contours to the top of the Corcoran clay. Based on Page's interpretation, the depth to the top is between 500 to 550 feet over the majority of the area with a thickness of 20-40 feet. The structure contours reveal the structure of the clay as a southerly dipping anticline with about 50 feet of relief from the north to south beneath the JID area. On well completion reports it is commonly described as blue or green clay, claystone, or siltstone. The Corcoran Clay has also been described as greenish-grey, dense, compact, and non-laminated claystone or siltstone. The bottom 20 feet is usually silty and it is a characteristic marker on E logs. A few scattered sand lenses exist and in the eastern portions of the area can make up as much as 30 percent of the clay sequence.

Alluvial Deposits of Westside Origin

The Plan Area, being near but east of the axis of the valley, has for the most part been dominated by deposition from the Sierra Nevada. However, there is some indication that subsurface deposits west of JID originated from the Coast Ranges. Contemporaneous deposition from eastside and westside sources is shown in a drill hole located in 15S/16E, Section 17E (about 1 mile west of the Plan Area) at depths of 22 feet where westside deposits overlie eastside deposits. This indicates that the sediments from the two sources occur and overlap west of the Plan Area. USBR (1955) indicates that the westside deposits thin and pinch out easterly. While these sediments probably form a minor component of the area's useable aquifer, water originating from these sediments to the west could have a great impact on water quality.

2.4 - Aquifer Characteristics

Specific Yield

In order to establish the storage capacity of the underground reservoir it is necessary to derive estimates of the specific yield of the sediments. USBR (1955) derived estimates of specific yield for the upper water-bearing zone within JID. These values are based on specific yield estimates from two separate studies done in similar geologic settings. The USBR report defined the upper water-bearing zone as the depth interval between the 1948 static water level in shallow wells and the top of the Corcoran clay (about 30 feet to 500 to 550 feet bgs). USBR computations show specific yield for JID ranges from as high as 22 percent to as low as 6 percent for the sediments above the Corcoran clay. Specific yield contours show a tongue of higher specific yield extends southwestward across the northern portions of the JID area corresponding to eastside alluvial sediments. The higher specific yields are associated with this tongue of coarser grained sediments of Sierran origin.

Based upon estimates of specific yield by the USGS and the DWR, the average specific yield of the unconfined aquifer was estimated to be about 11 percent for the District and about 12 percent for the Eastside well field area. Findings from the KRCD Groundwater Management Plan Update (2005) indicate that specific yield in JID is 11.3 to 12 percent.

Safe Yield

Safe yield, or perennial yield, is difficult to quantify because of the shared nature of the aquifer and uncertainty in defining the term. In this analysis perennial yield is defined as the amount of pumping that can be supported over an average hydrologic base period that will not result in a long-term decline in water levels. The base period must be long enough to include both wet and dry hydrologic cycles.

One factor complicating the estimate of perennial yield for JID is that the District and Eastside well field region is not a "closed" ground water basin. That is, groundwater in the region is hydraulically connected to groundwater in adjacent areas within both the "Kings Basin" and the "Tulare Lake Hydrologic Region". If groundwater management activities substantially raised static water levels subsurface inflow would decrease, subsequently decreasing perennial yield.

A previous analysis performed by Provost & Pritchard Consulting Group, Inc. investigated the safe yield using the hydrology from 1975 to 1993. The analysis concluded that the perennial yield for JID is approximately 1,000 AF per year less than the District's estimated average annual pumping of 12,500 AF from within the District, and about 2,700 AF per year less than the average annual pumping from the Eastside well field. This results in an estimate of perennial yield of 11,500 AF per year for JID. Total average annual pumping for the Eastside well field area is unknown as the District's wells account for just a portion of the region's pumpage. Private irrigation wells pump an unknown additional amount. However, the total average annual amount pumped in the study period (1975-1993) appears to be around 2,700 AF per year more than the perennial yield.

Storage Capacity

If it is assumed that the useable ground water reservoir is the unconfined aquifer lying above the E-clay, an estimated ground water storage capacity can be calculated. The elevation of the base of the E-clay averages about 400 feet below sea-level within the District, with an average thickness of around 80 feet. The average ground surface elevation in the District is about 175 feet, resulting in an average total depth for the unconfined aquifer of about 495 feet. Assuming that it is undesirable to have the water table less than ten feet from the ground surface, the average thickness of the useable aquifer is around 485 feet. Applying an average specific yield of 0.11, and multiplying by the total District area of 26,392 acres results in an estimate of total unconfined aquifer storage capacity of 1,400,000 AF.

Groundwater Quantity

The entire District and surrounding lands overlie portions of an enormous aquifer. For water quality reasons most of the ground water pumping occurs along the Fresno Slough and eastward. The District currently operates about 60 turbine pumps which tap this aquifer.

The combined capacity of the wells in 2008 was approximately 93,310 gallons per minute (gpm), or around 208 cubic feet per second (cfs). The locations of the District wells are shown on **Figure 3**. As of 2007 there were only two known private in JID wells being used to supplement District water supplies.

Under the authority of a groundwater deed recorded on September 1, 1920, JID pumps a large portion of their ground water supply from outside the District. The area encumbered by the ground water deed is shown on **Figure 3**. The District operates a wellfield east of the Fresno Slough Bypass consists of about 35 wells feeding two canals; the Lassen Avenue Canal and the McMullin Grade Line (**Figure 3**). From 1986 to 1994, which was largely a drought period, the eastside wells supplied an average annual supply of about 21,000 AF. This was a little more than half of the District's total ground water pumping, which averaged around 42,000 AF per year through the same period.

JID generally uses surface water to the extent it is available and supplements it as necessary with groundwater. In years of average surface water supply total ground water pumping can be expected to be around 25,000 to 35,000 AF, with 15,000 to 20,000 AF coming from the eastside wellfield.

Transmissivity

Transmissivity data for the Plan area is sparse. Schmidt (2004) derived transmissivity values from a 5-day pumping test performed on Well C-81 at the K Basin. Schmidt notes that the transmissivity values are valid for the aquifer below the C-clay at that location. The perforated interval of the well from 250 to 500 feet bgs indicates that this well taps the aquifer between the C-clay and the Corcoran clay. Transmissivity values from that pumping tests ranged from 73,000 gpd/ft to 48,000 gpd/ft.

A study by Davis et al., (1964) summarized numerous regional specific capacity values from Pacific Gas & Electric pump tests performed across the San Joaquin Valley. Using data from field tests in the JID area, they calculated specific capacities ranging from 57 to 85 gpm per foot. Driscoll (1986) provides an approximate relationship between specific capacity data and transmissivity. Using this method, transmissivity values for the northern part of JID range from 106,500 to 127,500 gpd/ft, and range from 85,500 to 86,000 gpd/ft in the southern portion of the District. These values of specific capacity and transmissivity are probably valid for the unconfined aquifer, as at the time of the report most wells drilled in the area were most likely completed above the E-clay.

The City of San Joaquin performed pump tests in their Well No. 5 in July 2003. Estimated specific capacities ranged from 10.7 to 11.0 gpd/ft. Drawdown measurements from a step-drawdown test indicated a transmissivity of 43,000 gpd/ft, and for a constant discharge test indicated 39,000 gpd/ft.

Wells Yields and Depths

Well yields in JID range from around 400 to 2,000 gallons per minute (gpm), with most around 1,000 to 1,500 gpm (**Attachment 2**). Wells in the east side wellfield have yields ranging from about 800 to 2,300 gpm, with the typical well producing about 1,500 gpm. Well depths in the East-Side Well Field and along the James Bypass average about 500 feet deep ranging from 365 to 808 feet.

The characteristics of the three wells in the City of San Joaquin are shown in **Table 2.1** below.

Table 2.1 – City of San Joaquin Wells

Description	Well No. 3	Well No. 4	Well No. 5
Total Depth	510 ft	500 ft	495 ft
Perforated Interval	210-510 ft	300-500 ft	300-435 ft
Year Constructed	1968	1978	2003
% of City water in 2009	50	8	42
Yield	1,200 gpm	1,200 gpm	1,100 gpm

2.5 - Groundwater Levels

Regional Groundwater Levels

Figure 7 is a map showing regional groundwater levels (this map represents the best available depiction of regional groundwater depth, despite being slightly dated). Groundwater depths range from about 40 to 150 feet bgs in the Plan Area. Groundwater generally flows from northwest to southeast, and there is a considerable groundwater depression east of the Plan Area in the Raisin City Water District.

Historical Ground Water Levels

Appendix C includes a collection of hydrographs for indicator wells in JID. Groundwater level data is not available for the City of San Joaquin, but groundwater levels in the City are assumed to be similar to those shown on regional map (**Figure 7**).

Prior to development of JID, regional groundwater levels were typically within ten feet of the ground surface, and wells tapping the aquifer below the E-clay initially exhibited artesian flow. As land was brought into agricultural production, and with the advent of deep well turbine pumps, groundwater levels began to decline. By about 1950 water levels had begun a sharp decline that continued into the mid-1970's. In this period a significant portion of the unconfined aquifer was dewatered, and a large cone of depression developed outside of JID in the Raisin City area.

Beginning in the mid-1970's and continuing to the present, is a trend of much slower ground water decline. Water levels have continued to fluctuate in response to drought and

flood years but have not exhibited nearly as strong a downward trend. This slowing in groundwater level decline probably resulted from increased groundwater inflow induced by the large cone of depression that has formed in the region, as well as groundwater recharge projects implemented by JID.

Water levels in wells tapping the confined aquifer in the region west of JID, (below the E-clay) also declined precipitously through the 1950's and 60's. However, due to the confined nature of the aquifer, these declines track the piezometric or pressure surface of the ground water, and therefore do not indicate a physical reduction of water in storage in the confined aquifer. This downward trend reversed dramatically in the mid-1960's in response to initiation of delivery of imported surface water from the USBR's Central Valley Project (CVP). This surface water supply resulted in decreased pumping from beneath the E-clay in regions west of JID. Water levels in wells pumping from the confined aquifer once again began to decline steeply in the early 1990's when imported water supplies declined as a result of an extended drought.

The Lower Kings Basin GMP provided an evaluation of regional groundwater levels in the Kings Basin. The GMP concluded that there has been a significant regional decline in groundwater levels between 1950 and 2000 and estimate a continued decline. The construction and operation of Pine Flat Dam, while helping to address groundwater issues by providing surface water, has not completely mitigated overdraft conditions in the Lower Kings Basin. According to the GMP, the average annual rate of groundwater overdraft in the Lower Kings Basin is 68,000 AF/year. Groundwater levels are expected to decline in the future if current groundwater management practices remain unchanged.

2.6 - Groundwater Quality

Overall ground water quality has not appeared to change significantly over the years. Ground water quality is generally better on the east side of the District, although salt plumes caused by the unregulated discharge of oil-field brines have degraded ground water in the District's east side wellfield. The poorer quality ground water on the west side of the District is apparently now advancing further into JID.

Ground water pumped by the District is generally of poorer quality (higher salt content and more sodic) than its surface water supply. However, most of the ground water supply is still of good to fair quality for irrigation. The relatively high sodium content of the water has caused infiltration problems in some areas of the District. **Appendix D** includes total dissolved solids measurements for wells in JID from 1977-2009. **Appendix F** includes groundwater quality graphs and a summary of groundwater quality in different regions on JID. In general, groundwater quality is the best in the southern part of JID, and northern parts of the eastside well field, and is worst in the central part of the wellfield. Refer to the groundwater quality maps and tables in **Appendices D** and **F** for more detail.

Oil wells in the area have always brought up brackish water (exceeding 60,000 ppm in salts) with the oil. Prior to the mid-1950's this brackish water was disposed in unlined pits

and was allowed to percolate into the ground water. This led to degradation of groundwater in the Eastside well field due to disposal of saline waters in the Raisin City Oilfield. Unlined pits are now illegal, and deep well injection is used to dispose of the brackish water.

Surface Water Quality

Surface water in JID comes primarily from the Kings River and Delta Mendota Canal (through Fresno Slough and Mendota Pool, respectively). Kings River water is of excellent quality for irrigation. Salt content, measured as total dissolved solids (TDS), typically runs around 50 parts per million (ppm) and boron content is generally less than 0.1 ppm. Infiltration problems sometimes occur due to the purity of the water. Beneficial calcium ions tend to be leached from the soil, reducing permeability. Water supplied from the Delta-Mendota Canal to the District is of good quality for irrigation. TDS for the water is generally around 400 ppm and boron content is typically less than 0.5 ppm.

City of San Joaquin

Groundwater quality in the City is very good, possibly as a result of JID importing significant quantities of pure surface water into the area. Surface water treatment is currently limited to wellhead treatment with chlorine. However, the City is concerned about the migration of poorer quality groundwater from outlying areas, and would like to monitor the encroachment of these water sources.

3 - BASIN MANAGEMENT OBJECTIVES

The Plan Participants have adopted the following five Basin Management Objectives:

1. **Stabilize Water Levels.** Stabilize average long-term groundwater levels by 2015 to prevent the loss of groundwater reserves, and prevent the need for well deepening, and reduce the new for installing new wells.

2. **Increase Groundwater Storage.** Increase groundwater storage capabilities through the development of groundwater banking projects including the JID Water Augmentation Project.

3. **Prevent Further Land Subsidence.** Prevent further land subsidence that can cause a reduction in groundwater storage space and damage water infrastructure. Prevent land subsidence caused by groundwater withdrawals through efficient use of groundwater supplies and full utilization of surface supplies.

4. **Prevent Groundwater Degradation.** Prevent groundwater degradation by protecting groundwater through proper well construction and abandonment, proper use of agricultural amendments, importing clean high quality surface water, and preventing intrusion of poor quality groundwater from neighboring areas.

5. **Improve Coordination between the City of San Joaquin and James Irrigation District.** Improve integrated groundwater management between the City and JID through better coordination, data sharing, joint projects, and annual coordination meetings.

6. **Improve Water Conservation.** Improve water conservation as an alternative to developing new water supplies or increased groundwater pumping. Conservation measures include urban and agricultural best management practices such as metering, plumbing retrofits, efficient irrigation systems, and educational programs.

7. **Increase Knowledge of Local Geology and Hydrogeology.** Increase knowledge of the local geology and hydrogeology through technical studies, and subsurface investigations. Gain a better understanding of regional groundwater quality and flow conditions, and potential impacts from surrounding water sources with poor water quality. Seek funding for these investigations through State and Federal grant programs.

More specific goals related to these BMOs are found in following sections. All existing and on-going activities described in Sections 4-9 will be maintained, unless stated

otherwise. (In Sections 4-9 the Existing Activities are not repeated under Planned Actions, even though they will be continued in the future). All new policies and projects described in Sections 4-9 will be pursued, but their implementation will be subject to available funding and staff time.

4 - STAKEHOLDER INVOLVEMENT

4.1 - Groundwater Advisory Committee

The purpose of a Groundwater Advisory Committee (GAC) is to oversee the creation, updating and implementation of a Groundwater Management Plan. Preferably, the Committee should be comprised of a broad cross section of interests in the Plan Area. James Irrigation District initially invited the public to participate but no local residents expressed interest. JID also invited several local agencies to participate in the Groundwater Advisory Committee but the City of San Joaquin was the only party showing interest. Eventually, JID and the City agreed to jointly prepare a GMP. As a result, both the San Joaquin City Council and JID Board of Directors served as temporary Groundwater Advisory Committees for overseeing the development of the GMP. These two GACs offered several useful and insightful comments that were incorporated into this GMP. After adoption of this GMP, a GAC comprising members of both agencies will be formed to assist with implementing the GMP. The GAC will include two to three members from each agency and will meet annually.

Existing Activities

Assisted with the development of this GMP.

Planned Actions

The Committee will attempt to meet annually, or more frequent if deemed appropriate, and will have the following responsibilities:

- Review trends in groundwater levels and available information on groundwater quality;
- Evaluate the effectiveness of current groundwater management policies and facilities;
- Discuss the need for new groundwater supply/enhancement facilities;
- Educate landowners on groundwater management issues;
- Assess the overall progress in implementing the programs outlined in the Groundwater Management Plan;
- Recommend updates or amendments to the Groundwater Management Plan;
- Identify regional and multi-party groundwater projects; and
- Review and comment on Annual Groundwater Reports.

4.2 - Relationships with Other Agencies

The Plan Area is located in the Kings Groundwater sub-basin and San Joaquin Valley Groundwater basin, which extend beyond many political boundaries and includes other municipalities, irrigation districts, water districts, private water companies, and private water users (see **Figure 2**). This emphasizes the importance of inter-agency cooperation, and the District and City have historically made efforts to work conjunctively with many other water management agencies.

The City of San Joaquin and James Irrigation District have strengthened their working relationship by collaborating on this GMP and signing a Memorandum of Understanding (MOU). The MOU outlines a plan for the two agencies to share information, meet regularly, and collaborate on groundwater management and water conservation projects (see **Appendix E**).

Below is a list of some other agencies that the District or City have worked with in managing local groundwater resources**:**

- Kings River Conservation District
- Kings River Water Association
- United States Bureau of Reclamation
- Department of Water Resources
- McMullin Recharge Group
- San Luis and Delta-Mendota Water Authority
- Association of California Water Agencies
- Agricultural Water Management Council
- Tranquillity Irrigation District
- Mid-Valley Water District

Following is a brief discussion on the relationships between these agencies and the Plan Participants.

Kings River Conservation District

KRCD is a legislatively defined special district that supports local interests in water planning and management, develops projects, collects groundwater data, and prepares an annual report of groundwater conditions; however, KRCD does not have the legislative authority to manage groundwater. The District has recently passed a resolution in support of the KRCD's *"Lower Kings Basin Groundwater Management Plan Update"*.

Kings River Water Association

JID is a member of the Kings River Water Association (KRWA), a 28-member group of water agencies that was formed in 1927 to administer and manage water uses on the Kings River. The benefits of KRWA membership include conflict resolution mechanisms and improved coordination among member agencies. The KRWA opens lines of communication so that members can work together effectively to utilize, trade, and transfer waters from the Kings River.

USBR/DWR

JID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires JID to take water level measurements from specified wells two times a year and share the data with USBR. USBR shares this data with the DWR.

McMullin Recharge Group

The McMullin Recharge Group (Group) is comprised of James Irrigation District, Mid-Valley Water District, Raisin City Water District, Tranquillity Irrigation District, Terranova Management Co, LLC., and Kings River Conservation District. The Group works cooperatively to investigate groundwater recharge projects in the area of the McMullin Grade, just east of the James Irrigation District, adjacent to the Eastside Well Field. The group members share information and JID has acquired valuable knowledge of the local geology as a consequence of their participation.

San Luis and Delta-Mendota Water Authority

James Irrigation District is a member agency of the San Luis and Delta-Mendota Water Authority (SLDMWA), an umbrella organization for 32 water agencies in the Central Valley. The SLDMWA was established in 1992 and represents approximately 2,100,000 acres of federal and exchange water service contractors within the western San Joaquin Valley, San Benito and Santa Clara Counties. The JID General Manager is on the Board of Directors at SLDMWA and is a member of its Water Resources Committee.

The SLDMWA serves the information and representation needs of its members by developing, providing, and disseminating information to legislative, administrative and judicial bodies concerning a variety of issues such as: Sacramento and San Joaquin Delta exports, water supply, water quality, water development, conservation, distribution, drainage, contractual rights, surface and groundwater management, and any other common interest of the member agencies. The SLDMWA also works with other governmental and public agencies to promote the common welfare of the landowners and member water agencies.

The SLDMWA prepared a regional water management plan in 2005 entitled "*Westside Integrated Water Resources Plan*". The Plan provides guidance for JID and other water agencies on regional priorities and multi-agency projects.

Association of California Water Agencies

JID is an active member of the Association of California Water Agencies (ACWA). ACWA fosters cooperation among all interest groups concerned with stewardship of the state's water resources. JID attends the ACWA annual meeting and benefits from the educational and informational services that ACWA offers.

Agricultural Water Management Council

JID is a member of the Agricultural Water Management Council (AWMC or Council). The AWMC was formed in 1996, following the work of an advisory committee formed by Assembly Bill (AB) 3616, Agricultural Efficient Water Management Act of 1990. The

Council consists of members of the agricultural and environmental communities and other interested parties with the expressed goal for water suppliers to voluntarily develop Water Management Plans and implement Efficient Water Management Practices (EWMPs) to further advance water use efficiency while maintaining and enhancing economic, environmental and social viability and sustainability of soil and crop production. Members sign a Memorandum of Understanding that includes a comprehensive methodology by which each and every Efficient Water Management Practice is analyzed and provides a consistent analysis by all participating water suppliers.

Tranquillity Irrigation District

JID had a long-term relationship with the neighboring Tranquillity Irrigation District. The two Districts have collaborated on SCADA monitoring projects in the Fresno Slough, and have discussed developing interties between the districts to provide better service to their growers.

Mid-Valley Water District

In 1999 and 2000, the Mid-Valley Water District, with the cooperation of James Irrigation District and Reclamation District No. 1606, evaluated the feasibility of a groundwater recharge basin near the James Bypass between Manning Avenue and American/Placer Avenues.

Existing Activities

- On-going involvement with the agencies and associations listed above.

Planned Actions

- When relevant to JID, implement the multi-agency projects identified in the Westside Integrated Water Resources Plan.

4.3 - Plan to Involve the Public and Other Agencies

The District and City of San Joaquin are already involved with many neighboring and regional agencies on groundwater management projects. Nevertheless, the Plan Participants are always interested in building new relationships with other agencies that share the same groundwater basins, and will also strive to involve the public in groundwater management decisions. Additional cooperative relationships can be achieved through the data sharing, inter-agency committees, interagency meetings, memorandums of understandings, formal agreements, and collaborations on groundwater projects. Furthermore, the development of this integrated GMP will foster cooperation between the City and JID.

Existing Activities

- Conducted public hearings to discuss the content of this GMP prior to its adoption.

Planned Actions

- Hold annual Groundwater Advisory Committee meetings with representatives from JID and the City.
- Provide copies of the JID annual groundwater reports to the public at their request. Notify the public of the availability of the annual reports in the JID District newsletter.
- Publish information on groundwater management accomplishments in the JID newsletter and City website.

5 - MONITORING PROGRAM

This section discusses monitoring of groundwater levels, groundwater quality, land surface subsidence, and surface water. Monitoring is considered critical to future management decisions, and the proposed monitoring program is intended to:

1. Provide warning of potential future problems;
2. Use data gathered to generate information for water resources evaluations;
3. Develop meaningful long-term trends in groundwater characteristics; and
4. Provide data comparable from place to place in the Plan Area.

JID prepared a Groundwater Quality Monitoring and Mitigation Plan in 2010 (see **Appendix F**). The plan includes a discussion on the District's existing groundwater quality, monitoring well network, groundwater level and monitoring program, and recommendations for protecting and mitigating groundwater quality. The plan enhances the discussion provided below on groundwater monitoring in JID.

5.1 - Groundwater Level Monitoring

The District regularly measures spring and fall water levels in District wells and a few private wells in cooperation with a valley-wide monitoring program coordinated by the USBR and the DWR. In addition, groundwater levels are monitored monthly in some shallow wells. **Figure 3** illustrates the location of wells that are monitored. **Attachment 2** includes a list of attributes for these wells. The City of San Joaquin does not regularly measure groundwater levels in their wells, but relies on the regional data collected by JID. However, the City will be installing three monitoring wells at their wastewater treatment plant in 2010 or 2011, which will be monitored on a regular basis.

The purpose of a groundwater level monitoring program is to provide information that will allow computation of the change in ground water storage. Contour maps depicting groundwater levels in the District and surrounding area will be prepared annually, along with estimates of changes in groundwater storage.

Existing Activities

- Measurement of groundwater levels in shallow monitor wells each month
- Measurement of groundwater levels each spring and fall in active and abandoned JID production wells
- Share groundwater level data with USBR and DWR

Planned Actions

- Periodically review the monitoring network to determine if it provides sufficient areal coverage to evaluate groundwater levels.
- Protect wells in monitoring program from being abandoned.
- Encourage landowners and developers to convert unused wells to monitoring wells.
- Prepare annual groundwater reports, which will include groundwater contour maps and detailed evaluations of groundwater level trends (see Section 9.2).
- Work with KRCD in the development of a Kings Basin Groundwater Data Center
- Perform a Well Canvass to collect detailed information and precise coordinates on each production well, monitoring well and abandoned well in the Plan Area (see **Appendix F** for more details on the proposed well canvass).
- Investigate the feasibility of installing a SCADA/telemetry system to monitor and operate production wells in JID. If available seek funding to assist with expenses.

5.2 - Groundwater Quality Monitoring

The City performs groundwater quality monitoring as required by the State of California. JID test each well for electrical conductivity annually and performs agricultural suitability analyses on all new wells.

The aforementioned groundwater quality monitoring efforts have one or more of the following objectives:

1) Spatially characterize water quality according to soils, geology, surface water quality, and land use;
2) Establish a baseline for future monitoring;
3) Compare constituent levels at a specific well over time (i.e. years and decades);
4) Determine the extent of groundwater quality problems in specific areas;
5) Identify groundwater quality protection and enhancement needs;
6) Determine water treatment needs;
7) Identify impacts of recharge and banking projects on water quality;
8) Identify suitable crop types that are compatible with the water characteristics; and
9) Monitor the migration of contaminant plumes.

Existing Activities

- Measure electrical conductivity in JID production wells on an annual basis.
- Perform agricultural suitability analysis on all newly constructed wells.

Planned Actions

- Regularly collect new water quality information from other agencies and review it to identify any impending groundwater quality problems.
- Protect wells in monitoring program from being abandoned.

- Prepare groundwater quality maps when sufficient information is available with the aid of a qualified hydrogeologist. Attempt to characterize groundwater quality with depth and provide the information to growers so they can use it when designing and installing wells.
- Work with KRCD in the development of a Kings Basin Groundwater Data Center.
- Perform Agricultural Suitability Analysis every 5 years (2015, 2020, 2025, etc.) in selected wells in areas of concern. This will be timed with the submission of 5-Year Water Management Plans to the USBR.
- Test for Additional Constituents in wells near the City of San Joaquin. If funding from the City of San Joaquin is available, perform more detailed water quality sampling in JID wells near the City of San Joaquin. This information could be useful in determining the quality of groundwater that may be migrating toward the City. Constituents that could be tested include arsenic, gross alpha, Total Organic Carbon, and other constituents important to drinking water quality.
- Regularly calibrate the hand-held TDS meter used to test wells each year, to help ensure that measurements are accurate and trends are properly identified.

5.3 - Groundwater Monitoring Protocols

Monitoring protocols are necessary to ensure consistency in monitoring efforts and are required for monitoring evaluations to be valid. Consistency should be reflected in factors such as location of sample points, sampling procedures, testing procedures, and the time of year when the samples are taken. Without such common ground, comparisons between reports must be carefully considered. Consequently, uniform data gathering procedures will be practiced by the Plan Participants.

The District has developed new water level and water quality monitoring protocols, which can be found in **Appendix G**. The District has also adopted protocols prepared by a local laboratory, Fruit Growers Laboratory of Visalia, California. These are included as **Attachment 4** and supplement the protocols described above. The City has not adopted specific protocols, but will follow JID's protocols until they adopt their own.

Existing Activities

None

Planned Actions

- The District will work with KRCD to establish uniform protocols that are used basin wide.
- The City will review JID's protocols and adopt them or develop their own protocols.

5.4 - Surface Water Monitoring

Surface water sources in the Plan Area include the Fresno Slough and Fresno Slough Bypass. In addition, the Mendota Pool is located near JID and is a source of surface water.

Existing Activities

- Monitor flowrates in the Fresno Slough Bypass.
- Monitor surface water quality in the Mendota Pool at P Booster.

Planned Actions

None

5.5 - Land Surface Subsidence Monitoring

Land subsidence results from excessive groundwater pumping beneath laterally extensive confining clay layers. The removal of groundwater from a confined aquifer causes increased pressure on the aquifer skeletal system below the confining layer. This causes compaction of the fine-grained layer at depth, and is evident at the ground surface as land subsidence. Land subsidence has been monitored throughout the San Joaquin Valley. The most serious subsidence occurred north of the Districts and monitoring efforts have declined in recent years.

A State-Federal committee on subsidence was formed in the early 1950's and performed research and measured subsidence until 1970. By 1970, 5,200 square miles in the Valley had subsided more than 1 foot. Between 1926 and 1970, a maximum of 28 feet of subsidence was measured at a point southwest of Mendota. The compacting forces caused by groundwater level decline squeezed more than 15.6 million acre-feet of water storage space out of the sediments during the same period. From 1975 to 1992, subsidence occurred mostly in drought years when groundwater pumping replaced unavailable surface water supplies. The Department of Water Resources has continued to measure subsidence along the California Aqueduct in the winter of 1993-1994. Very little quantitative data has been collected since 1970 by others. In neighboring Tranquillity Irrigation District, there is a benchmark on Lift Station No. 1 that is periodically resurveyed to check for land subsidence.

It is likely that some of the local land subsidence has been arrested with the importation of large volumes of surface water since the District established its surface water contracts. However, there is often a time delay in subsidence after groundwater withdrawals, so the Plan Area may still be experiencing residual subsidence. In addition, groundwater levels can drop appreciably in extended droughts, which could also lead to further subsidence. Lands within the Plan Area will be observed for land

subsidence, and, if land subsidence becomes a problem, this Plan will be amended to include preventative and mitigative measures.

Existing Activities
None

Planned Actions
- Periodic resurvey of control points and local benchmarks to check for land subsidence. The control points and local benchmarks will be checked relative to High Precision Geodetic Network benchmarks.

6 - GROUNDWATER RESOURCES PROTECTION

6.1 - Well Abandonment

Existing State and Fresno County law requires that owners or lessees properly destroy their abandoned wells. Proper destruction of abandoned wells is necessary to protect groundwater resources as abandoned or improperly destroyed wells can result in water of different chemical qualities from different strata mixing, and useable groundwater being degraded. This is especially important because part of the Plan Area has a confined aquifer.

The administration of a well construction, abandonment and destruction program has been delegated to the Counties by the State legislature. Fresno County has adopted a permitting program consistent with Department of Water Resources Bulletin 74-81 for well construction, abandonment, and destruction.

The Plan Participants will properly abandon their own wells when they are no longer useful. In addition, they will encourage landowners and developers to properly abandon their own wells, or preferably, convert unusable wells to monitoring wells so that they can become a part of JID's groundwater monitoring program.

Existing Activities

None

Planned Actions

- When possible, convert unusable production wells to monitoring wells.
- Destroy any District or City owned wells that have no use according to County and State standards.
- Seek funding to perform a survey of all inactive wells and properly abandon those that have no potential for rehabilitation or use them as monitoring wells.

6.2 - Wellhead Protection

The Federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986. The purpose of the program is to protect groundwater sources of public drinking water supplies from contamination, thereby eliminating the need for costly treatment to meet drinking water standards. The program is based on the concept that the development and application of land use controls, usually applied at the local level in California, and other preventative measures can protect groundwater.

A Wellhead Protection Area (WHPA), as defined by the 1986 Amendments, is "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The WHPA may also be the recharge area that provides the water to a well or wellfield. Unlike surface watersheds that can be easily determined from topography, WHPA's can vary in size and shape depending on subsurface geologic conditions, the direction of groundwater flow, pumping rates and aquifer characteristics.

Under the WHPA, States are required to develop an EPA-approved Wellhead Protection Program. To date, California has no state-mandated program, but instead relies on local agencies to plan and implement programs. This is one of the factors that prompted the State Legislature to enact AB 3030. Wellhead Protection Programs are not regulatory in nature, nor do they address specific sources. They are designed to focus on the management of the resource rather than control a limited set of activities or contaminant sources.

Essential to any wellhead protection program are proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources. Wells constructed by the Plan Participants will be designed and constructed in accordance with DWR Bulletin 74-81. In addition, landowners will be encouraged to follow the same standards for privately owned wells. DWR Bulletin 74-81 provides specifications for the following:

- Methods for sealing wells from intrusion of surface contaminants;
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism;
- Site grading to assure drainage is away from the well head; and
- Set-back requirements from known pollution sources.

Existing Activities

- Provide wellhead protection on all newly constructed wells according to County and State standards.

Planned Actions

- Encourage local growers to incorporate proper wellhead protection into all new wells, and retrofit old wells with proper wellhead protection.

6.3 - Saline Water Intrusion

Saline water intrusion is a concern in two portions of the Plan Area. The first is a generalized condition on the west side of JID. The groundwater in the western portion of the District is significantly saltier than in the eastern portion. Additionally, given the

direction of ground water flow is in a southeasterly direction, this poorer quality water is encroaching on many of the District's wells.

The second area of concern, the Raisin City Oil Field salt plumes, lies outside the District boundaries but affects the District's east-side wellfield. These plumes formed when brines pumped from oil wells were disposed in surface ponds. It is believed that these plumes currently impact JID wells, even though the practices that created them were halted over three decades ago.

Currently, the District strives to prevent the importation of saline surface waters that could ultimately degrade the groundwater. When alternative water sources are available for importation, the District considers not only the cost but also the quality, including salinity, of the water. The District will evaluate all possible alternatives, and, when practical and feasible, select water sources with acceptable levels of salinity.

Existing Activities
None

Planned Actions
- Review available water quality data to identify areas with the potential for saline water intrusion.

6.4 - Migration of Contaminated Groundwater

Ground water contamination can originate from many sources or activities. Groundwater contamination can be human induced or caused by naturally occurring processes and chemicals. Sources of groundwater contamination can include irrigation, dairies, improper application of agricultural chemicals, septic tanks, industrial sources, stormwater runoff, and disposal sites.

Clean-up of contaminated ground water is a complex and expensive task generally involving a number of organizations. Agencies with roles to play in mitigating ground water contamination include the California Regional Water Quality Control Board (RWQCB), the California Department of Toxic Substances Control (DTSC) and the U.S. Environmental Protection Agency (EPA). Each agency has its own set of regulatory authorities and expertise to contribute. The degree to which they participate depends on the nature and magnitude of the problem. If JID or the City identify a ground water contamination problem, they will refer the information to the appropriate regulatory agency.

According to the Lower Kings Basin GMP, the migration of contaminated groundwater is a secondary concern for the area. Contaminated plumes are relatively small and localized in the Lower Kings Basin. Furthermore, the Plan Participants do not know of

any contaminant plumes in their service area, aside from salinity from the Raisin City Oilfields. Nevertheless, the Plan Participants recognize that migration of contaminated groundwater is always possible. The City and District will continue to monitor groundwater quality and remain cognizant of the possibility of contaminated groundwater migration into the Plan Area.

Existing Activities

- Regularly review data and reports from regulatory agencies on contaminant plumes to provide warning of potential future problems.
- Construct wells with adequate seals between the formations to prevent the downward migration of poor quality water.

Planned Actions

- Seek to locate recharge basins next to areas with water quality problems to blend water supplies and create a hydraulic barrier to impede movement of contaminant plumes.

6.5 - Groundwater Quality Protection

The City relies exclusively on groundwater and JID cannot support all of their crop demands with their surface water supplies. Clearly, groundwater is a very important resource in the area. The groundwater, however, will have limited or no use if it has poor quality. Therefore, protecting the quality of the groundwater is a cardinal component of this GMP. Groundwater quality can be protected through proper use of pesticides, herbicides and fertilizers, stormwater quality management, septic system management, and water vulnerability planning and management.

JID has outlined several existing and proposed methods for protecting and mitigating groundwater quality. These are document in their Groundwater Quality Monitoring and Mitigation Plan (**Appendix F**)

Existing Activities

- Educate staff on proper use of herbicides used in JID canals.

Planned Actions

- Seek funding to improve security at water facilities and reduce the potential for contamination from acts of vandalism or terrorism.
- Educate growers on the proper use of pesticides, herbicides and fertilizers in the District newsletter.
- Implement groundwater mitigation methods documented in **Appendix F**.

7 - GROUNDWATER SUSTAINABILITY

Between 2000 and 2009, groundwater has comprised about 45% of the water used in JID in a typical year, but has comprised up to 78% of water supplies. During years with low surface water allocations, groundwater is essential to prevent the loss of permanent crops. The City of San Joaquin relies exclusively on groundwater and has no surface water rights or facilities to accept surface water. Therefore, preserving the sustainability of groundwater is essential for the economic well being of the District growers and City residents.

7.1 - Issues Impacting Groundwater Sustainability

The James Irrigation District relies on both surface and groundwater for irrigation demands. **Table 7.1** shows surface and groundwater usage from 2000-2009.

Table 7.1 – James Irrigation District Surface and Groundwater Use (2000-2009)

Year	Surface Water		Groundwater	
	Volume (AF)	%	Volume (AF)	%
2009	15,900	22	55,100	78
2008	21,300	27	56,900	73
2007	34,300	42	48,200	58
2006	67,400	91	6,300	9
2005	50,300	69	22,500	31
2004	38,600	47	43,000	53
2003	39,000	51	37,400	49
2002	37,400	43	48,700	57
2001	26,400	35	48,600	65
2000	35,400	49	36,400	51
Avg	36,600	48	40,300	52

Table 7.1 shows that for typical years, groundwater constitutes about 50% of the District's water use. In almost all years the District's surface water supply is fully utilized, and groundwater is pumped to supplement the surface water. Typically, groundwater pumping begins in the middle of the irrigation season and groundwater is often the only water source available at the end of the irrigation season (August to October).

2005 and 2006 were not typical years since flood waters were released down the Kings River. When this was available JID used the flood water instead of their CVP supply,

and saved their CVP supply for a later date. This permitted for a larger and longer supply of surface water which allowed for decreased groundwater pumping, and groundwater recharge as a result of diverting flood flows. A two year supply of flood water only occurs occasionally and cannot be relied upon.

The District's surface water supplies are sporadic, unreliable and unpredictable. In addition, due to recent regulatory actions, surface water supplies from the Central Valley Project have become less dependable and shortages occur more frequently. This has caused the District's available surface supplies to be reduced causing more reliance on pumping groundwater. Furthermore, the acquisition of new water contracts or substantial water transfers in the future is unlikely. In summary, groundwater supplies are vital to the JID and consequently the District considers the proper management of their groundwater resources to be imperative.

The City of San Joaquin relies exclusively on groundwater. When local and regional groundwater supplies are stressed, such as during droughts, this can impact groundwater supplies in the City. It is unlikely that the City can secure a long-term surface water contract, and therefore they must protect and preserve the local groundwater resources.

7.2 - Overdraft Mitigation

Overdraft of the groundwater supply can lead to a variety of problems, including subsidence and increased pumping costs. Additionally, if overdraft continues unchecked, the groundwater supply may be unreliable when surface water is scarce, as in a time of extended drought. Groundwater overdraft is considered the principal groundwater problem in the Plan Area.

Groundwater Overdraft Estimates

JID estimates overdraft using historical groundwater levels during a hydrological base period. This base period must extend for a long enough time that both wet periods and droughts are covered, and the water supply conditions approximate the average. The term overdraft is used here to indicate a long-term water-level decline in an area during an average hydrologic base period. It is not used to describe short-term water-level declines during droughts.

The procedure to estimate overdraft from groundwater levels uses many measurements over a long period of time. In the Plan Area, measurements are made in the winter or early spring, following a period of minimal pumping, and again in the fall, following a period of heavy pumping. The complete water-level data record can be used to prepare well water-level hydrographs and to determine long-term water level changes. A well water-level hydrograph is a plot of depth to water versus time for a particular well.

After the well water-level hydrographs are prepared, the trends in the water levels in the base period are closely examined. In most agricultural areas the annual low values are in the late summer or early fall, at the end of a long irrigation season, and annual high values are in the winter or early spring, just before pumping begins for the next growing season. Linear regressions are then performed on the data within the base period that appear valid and representative of the water-level conditions. The slope of these "best-fit" lines are then used as the long-term average annual changes in ground water level.

JID calculated overdraft during the period from 1975 to 1993, but has not performed any more recent analyses. The hydrographs created indicate gradual long-term water-level declines in both the District and the east side wellfield for the chosen hydrologic base period. In order to determine the change in ground water storage, a parameter known as the "specific yield" was multiplied by the average water-level change during the period evaluated. Specific yield is the ratio of the volume of water which will drain freely from a material to the total volume of the formation. Based upon estimates of specific yield by the USGS and the DWR, the average specific yield of the unconfined aquifer was estimated to be about eleven percent for the District and about twelve percent for the east side wellfield area. Using these specific yields, the ground water overdraft was calculated to be about 1,000 AF per year for the District, and around 2,700 AF per year for the eastside wellfield for the chosen hydrologic base period.

Overdraft could be a significant concern if the Plan area experiences increased pumping, reduced recharge, and/or increased ground water outflow. Periodic analyses of ground water overdraft, perhaps every five years, are needed to reassess the need for overdraft mitigation.

Mitigation Measures

Groundwater overdraft is due to an imbalance in the rates of extractions and replenishment. There are several methods to correct this imbalance. The first is to decrease the extraction to match the rate of replenishment. The second is to increase groundwater replenishment to match the extraction rate. The third method is a combination of the first two, to balance replenishment and extraction. Each of the methods are applied over an extended period, making use of the storage capacity of the aquifer. Extractions can exceed replenishment in drought periods as long as replenishment equally exceeds extractions in wetter periods.

Factors that will affect the future rate of overdraft include surface water supplies available to JID through the Central Valley Project and future water demands in the District.

The District utilizes both surface water and groundwater conjunctively to meet the water needs of its growers. The Plan Participants understand that the existing condition of overdraft is regional in nature and correction and mitigation of the problem will need to be addressed not only by the District and City, but also by neighboring agencies.

Groundwater Recharge

Mitigation measures to negate current overdraft and contribute to lessening future overdraft conditions rely on the importation of additional surface supplies. Increasing JID's surface water supply would rely on improving the District's ability to use excess Kings River flows. Flood water appears adequate on the Kings River to mitigate the overdraft condition if sufficient recharge capacity can be developed. JID already recharges water in the K-Basin Recharge Project and plans to recharge additional flood waters with their proposed Water Augmentation Project (see Section 7.4).

Mitigative measures to reduce demands can include conversion to more efficient irrigation systems, and urban conservation measures discussed in Section 7.5. Demand reduction can also be achieved by cropping changes or land fallowing, but these would have adverse economic impacts and therefore are not considered.

Water Transfers

In 2001 the JID Rules and Regulations were amended to restrict the transfer of surface and groundwater supplies outside of the District. The purpose of this amendment was to prevent further groundwater overdraft. Specifically, the Rules and Regulations state:

> "*Any transfer of surface water which is replaced by increased groundwater pumping would therefore exacerbate groundwater overdraft....Similarly, if a Water User were to pump groundwater within the District and export it, the same effect would occur*." (pg 8)

Such exports are only allowed under certain circumstances; for example, surface water exports are allowed if the land that would have used the water is fallowed. Refer to the Rules and Regulations for more details on this policy. Clearly, the District recognizes the gravity of their groundwater overdraft problem and this amendment illustrates their commitment towards preserving their groundwater resources.

Limitations on Pumping

The California Water Code gives water and irrigation districts the power to limit or suspend groundwater extractions. However, such limits will only be implemented if the Plan Participants determine through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen impacts to groundwater. In the unlikely event that it becomes necessary to reduce groundwater extractions, the District intends to accomplish such reductions under a voluntary program, which would include suitable incentives to compensate users for reducing their groundwater pumping. The District will not attempt to restrict or otherwise interfere with any landowner or water user exercising a valid right to pump and utilize groundwater.

Economic Inducements

The District recognizes that management of water supplies should reflect water conservation and the protection of groundwater resources. The District currently provides an indirect economic inducement by establishing water rates high enough to promote water conservation yet low enough to compete with groundwater pumping costs. This pricing system encourages the use of surface water to meet irrigation demands when available, thereby preserving the underlying groundwater resource.

Existing Activities

- Restrict groundwater exports from the District.
- Set surface water rates low enough to be competitive with groundwater pumping costs.

Planned Actions

- Urban water conservation measures (see Section 7.5)
- Seek funding to prepare a Drought Preparedness Plan that will identify triggers and response measures for droughts.

7.3 - Groundwater Replenishment

Replenishment of ground water is an important technique to manage a groundwater supply and mitigate a condition of overdraft. The estimated overdraft for the Plan Participants and the east side wellfield can probably be offset with recharge projects that would use excess Kings River flows (flood releases from Pine Flat Reservoir).

The types of groundwater replenishment include the following:

- Direct groundwater recharge
- Incidental groundwater recharge
- Injection wells
- In-lieu recharge
- Groundwater banking
- Canal seepage
- Pipeline seepage
- Flood flow seepage
- Deep percolation from precipitation
- Deep percolation from irrigation

Direct Groundwater Recharge. Two recharge projects are currently in operation in JID. The first involves the diversion of Kings River flood water from the Fresno Slough Bypass (James Bypass) into basins in the upland areas of the Bypass between the two outer flood channels. The Bypass area has fairly permeable soils and provides a modest opportunity for ground water replenishment. This project may have potential for expansion. The second project includes the 220-acre K-Basin Project. Some of this water is recovered with wells and some of the water remains underground for recharge. The District is also

developing recharge capability with the Water Augmentation Project, described in Section 7.4

Incidental Groundwater Recharge. Incidental groundwater recharge occurs in the three stormwater basins operated by the City of San Joaquin, located at Colorado Avenue, California Avenue and Cherry Lane. Flows to these basins are not measured and there are no current estimates of the volume of incidental recharge.

Injection Wells. Injection wells pump water directly into the groundwater basin and are primarily used in urban areas, where land is at a premium. Capital costs are high and include conveyance, treatment and well construction. Some injection well projects have been denied by the Regional Water Quality Control Board due to water quality issues, especially disinfection byproducts in the source water. Given the high cost of injection wells, regulatory hurdles and the presence of more viable and lower costs options for recharging water, this option was removed from further consideration.

In-lieu recharge. The District views in-lieu deliveries as the most practical and effective means of groundwater replenishment. In-lieu deliveries, also called indirect deliveries, involve the delivery of surface water to landowners and water users who would otherwise have pumped groundwater, thus leaving water in the aquifer for future use. From 2000 to 2006, JID imported between 26,000 and 67,000 AF/year of surface water, and, as a result, JID is performing a significant amount of in-lieu recharge.

Groundwater banking. Groundwater banking agreements often require that a portion of the banked water be left in the aquifer as a payment to the banking agency. JID is planning to develop a groundwater bank through the Water Augmentation Project. Water banking partners will be required to leave 10% of their water behind for District recharge.

Canal seepage. Canal seepage in JID is estimated to be about 12,300 AF in a typical year.

Pipeline Seepage. Seepage from City of San Joaquin pipelines, and JID's Lateral G pipeline, help to recharge the groundwater. No estimates of the seepage are currently available.

Flood flow seepage. Natural seepage occurs in the District from flood flow waters in the Fresno Slough and the James Bypass channel. However, this seepage volume has not been measured or estimated.

Deep percolation from precipitation. In JID, deep percolation from normal rainfall events is probably negligible. Some deep percolation occurs during exceptionally long and heavy storms. However, such storms are infrequent.

Deep percolation from irrigation. Deep percolation occurs when some of the water applied for irrigation percolates beyond the crop root zone and accumulates in the aquifer. The extent of deep percolation varies with the irrigation method, irrigation efficiency, and antecedent moisture condition. During 2002 and 2003, deep percolation from local irrigation was estimated to be from 8,000 to 10,000 AF/year, but was only estimated to be about 2,000 AF in 2009.

Existing Activities

- Groundwater recharge in the 220-acre K-Basin recharge project.
- Groundwater recharge in the Fresno Slough and Fresno Slough Bypass
- Measure the volume of water delivered to groundwater recharge basins.
- Periodically remove sediment and rip the soils in recharge basins to maintain recharge rates.

Planned Actions

- Work cooperatively to minimize development on lands that are favorable for artificial recharge.
- Design and construct the Water Augmentation Project, which will increase recharge capabilities in the District
- Estimate seepage from City of San Joaquin pipelines either from water balance calculations or through field tests.
- Install staff gauges in City of San Joaquin stormwater basins so incidental recharge can be estimated.

7.4 - Conjunctive Use of Water Resources

Conjunctive use of water is defined as the coordinated use of both subsurface and surface water sources so that the combination will result in optimum benefits. Conjunctive operation of a ground water basin is defined in DWR Bulletin 118-80 as:

> *"Operation of a ground water basin in coordination with a surface water reservoir system. The basin is intentionally recharged in years of above average precipitation so ground water can be extracted in years of below average precipitation when surface water supplies are below normal."*

Such management results in the groundwater storage being reduced in dry periods and increased in wetter periods. To avoid a condition of overdraft, replenishment must balance extraction over the long-term.

A conjunctive use program requires:

- A source of surface water in years of high surface water supply.
- Recharge facilities.
- Conveyance facilities to import and export water to and from the ground water storage area.

- Available storage capacity in the aquifer.
- Extraction facilities.
- Distribution facilities for surface and ground water.

Existing conjunctive use operations can be expanded by adding interconnections and promoting water supply exchanges between districts that allow for more flexibility in the region's water supply. The region's assets of federal, state, and local water supplies, dewatered groundwater storage, numerous interconnected conveyance facilities, and significant irrigation demand make it an ideal location to regulate surface and groundwater supplies conjunctively.

The region must absorb wet year water supplies in order to maintain a reliable and economical water supply. Wet year water is available on short notice and not always at times when the water can be delivered for an irrigation demand. Therefore, it is important that the region work cooperatively to increase its ability to absorb surface water when available. Regional Water Management Plans, including the 'Westside Integrated Water Resources Plan', can help identify viable regional projects.

Regional Conjunctive Use Projects

In 2004, JID completed construction of the 220-acre K-Basin Recharge Project. The project includes several wells to recover some of the recharged water.

The JID Water Augmentation Project will include new facilities for storing and recharging water, with the goal of reducing JID's dependence on surface water. The project will include improvements to basins and construction of new recovery wells and conveyance facilities. The project will provide facilities for regulation storage, floodwater storage, groundwater recharge, and groundwater banking. These facilities will be located just north of the James Weir in the Fresno Slough Bypass, about 3 miles southeast of the City of San Joaquin. It is estimated that the project will allow JID to capture and recharge an average of 2,100 AF/year of Kings River floodwater. Five recovery wells will have the capacity to extract 30 AF/day. JID will work with the City in locating the wells and will keep the City apprised of progress on the project. The project is currently being designed and construction is expected to be completed by the end of 2011 or 2012.

JID has also prepared a Water Banking Prospectus for the Water Augmentation Project. JID is actively seeking an agency that wants to bank water in JID using the proposed facilities. As a condition of any banking agreement at least 10% of the banked water must be left behind. This will contribute to local recharge and higher groundwater levels while the water is banked. The volume of water that will be banked still has to be negotiated with a potential banking partner.

One example of a 'regional' groundwater recharge project is the proposed McMullin Group recharge project. This project would use flood flows to recharge the groundwater system. The project, which includes a series of ponds and canals, was investigated and

a draft feasibility study was completed in April 2000. At that time, two sites in the McMullin Recharge Project area were considered covering 138 acres. With support from DWR grant funding, additional hydrogeologic evaluations have been made of the sites since the completion of the draft feasibility study. In response to interpretation of the hydrogeologic evaluations, several recharge ponds have been proposed for development. These ponds can be operated using available floodwater. This project was identified as a regional goal in the Lower Kings Basin GMP with estimated costs of $2.2 million and a completion date of 2010.

The City of San Joaquin does not have a surface water supply, but does divert stormwater to basins where some is percolated, thereby recharging the groundwater.

Existing Activities

- Continue groundwater recharge and banking in the K-Basin Recharge Project.

Planned Actions

- Support the development of new surface storage and water supply projects that would permit the participants to better utilize surface water supplies.
- Investigate additional groundwater banking projects and facilities.
- When transferring surface water, attempt to transfer it to neighboring agencies so it benefits local groundwater levels.
- Design and construct the JID Water Augmentation Project.
- Construct four production wells in JID as part of a Federal Drought Relief grant.
- Actively recruit regional water agencies to store water in JID's groundwater banking facilities.
- Discuss options with the Fresno Irrigation District to purchase surplus surface water to reduce demand on local groundwater resources.

7.5 - Water Conservation and Education

City of San Joaquin

The City of San Joaquin prepared a Water Conservation Plan in 2009. The plan identified several measures that can help reduce water consumption. The Plan outlined two general conservation strategies:

1) **Twenty Percent Reduction in Water Use.** A citywide reduction in water use of 20% by the year 2011 (to mirror the reduction goals of the current California Green Building Standards Code). These savings will be accomplished through equipment upgrades and a targeted education and community outreach program. Showerhead and faucet replacements are planned to be part of the upgrades installed as part of the city's low income housing rehabilitation program. Beginning in the 2010-2011 academic year, students at San Joaquin Elementary school will receive water conservation training.

2) **Water Meters.** Install water meters on all service accounts by the year 2020. California state law requires meters on all service accounts by the year 2025. Installing meters can also lead to reduced water use, and will enable to city to charge residents based on actual water usage. Studies show that cities with metered water use up to 15% less water than cities without meters. When meters are used to institute a tiered pricing structure, another 10% savings occurs. In addition to providing customers with feedback on their consumption levels, service meters in conjunction with supply meters, enable a system to better account for leaks in the system, The guidance from the EPA estimates that by installing meters water use can be reduced by 20%. Currently, only some commercial and industrial accounts are metered. Residential meters are planned for the future as required by the State. In the Water Conservation Plan, meters were not found to be the most economical alternative for conserving water, so the City will seek funding to assist with their purchase and installation.

The City's current ordinance that allows landscape watering only on certain days is also a fairly effective method in preventing over watering. The City will include inserts in water bills reminding residents of these landscape watering rules.

James Irrigation District

The District considers water conservation and education important aspects of their overall groundwater management efforts. All water deliveries are metered and billed based on the volume used. Therefore, all customers have an incentive to minimize water usage. Water conservation education is achieved through the annual grower's meeting and district newsletter. JID has also constructed several regulation reservoirs, that help to reduce operational spills and thus conserve water.

Existing Activities

- JID's monthly water statements include water use information for each customer. In addition, the District maintains historic water use by turnout. This data is available to water users on request as it could be beneficial in making on-farm water management decisions.
- The District holds an annual grower's meeting and publishes a semi-annual newsletter to help educate local growers on important issues such as water conservation and water quality protection.

Planned Actions

- Evaluate the feasibility of a grey water system in the City of San Joaquin.
- Seek funding to install water meters in the City of San Joaquin
- Implement the City of San Joaquin's water conservation education program.

7.6 - Water Recycling

The City does not currently recycle any of their water. Wastewater effluent is currently discharged to aerated lagoons at the western end of JID for evaporation and percolation. The annual volume of water treated is about 121 million gallons. The City plans to improve their wastewater treatment system to include advanced secondary treatment with activated sludge, nitrogen removal, and sludge handling. Construction of the new facilities is expected in 2010 or 2011. The effluent will have better quality that is suitable for non-edible crops. The City has held discussions with farmers to use the effluent, and also plans to meet with JID to discuss delivery of the water into the JID distribution system. No other urban agencies are located in the area that could feasibly deliver recycled water to the Plan Area.

The City has noticed some high salt contents in their wastewater. They are investigating whether a commercial or industrial entity is dumping wastewater with high salt loads.

Existing Activities

None

Planned Actions

- Remain cognizant of opportunities to purchase recycled water from other municipalities.
- Hold a joint meeting with the City and JID to discuss beneficial use of recycled WWTP water on JID crops. Discuss the merits of performing a feasibility study on importing recycled water to JID.
- Investigate the source of saline water in the San Joaquin wastewater.

8 - GROUNDWATER OPERATIONS

8.1 - Well Construction Policies

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. Department of Water Resources Bulletin 74-81 provides useful guidelines for the construction of groundwater wells. In addition, Fresno County has enacted and is responsible for enforcing a County Well Ordinance that regulates well construction. Proper wellhead protection is essential to ensure that contaminants do not inadvertently enter a well. Well construction policies that are intended to ensure proper wellhead protection are discussed in Section 6.2 – Wellhead Protection.

In addition, the following quality assurance procedures will be followed when constructing District or City owned wells. Landowners are also encouraged to follow these procedures when constructing private wells:

1. Well construction will be performed under contract by a licensed and experienced well driller, in accordance with specifications prepared by a licensed engineer or geologist, and reviewed by legal counsel.
2. A licensed engineer or geologist will oversee construction of the wells.
3. A licensed land surveyor will oversee survey of any newly constructed wells.
4. Wells will be constructed according to guidelines in DWR Bulletin 74-81.

Existing Activities

- Construct wells according to DWR Bulletin 74-81.
- Construct wells using qualified and licensed contractors, engineers, geologists and land surveyors.
- Use plastic well casings in areas where the groundwater and soils are highly corrosive.

Planned Actions

None

8.2 - Operation of Facilities

The City currently has three productions wells but has an immediate need for one more wells due to the age and condition of their current wells (the three wells are 10, 30 and 40 years old). The City is concerned about how they will pay for a new well and are seeking funding opportunities.

The City will be installing three monitoring wells at the water treatment plant expansion in 2010 or 2011. The wells are expected to have depths ranging from 50 to 80 feet deep.

Groundwater facilities in JID include the K-Basin Recharge Project, about 65 extraction wells and about 20 monitoring wells. Proper construction, operation, and maintenance of these groundwater facilities is an important part of groundwater management.

The District normally constructs two new irrigation supply wells each year and subsequently retires two older wells that have a combination of the lowest efficiencies and poorest water quality. This helps to ensure the District's water reliability (by retiring older wells), and ensuring higher water quality. This also expands the grid of available testing points.

JID will also strive to provide the best facilities for delivery of surface water supplies, since they are used conjunctively with groundwater. JID realizes that the success of conjunctive use programs is often contingent on the quality of surface water conveyance systems.

Existing Activities

- Development of a groundwater bank as part of the JID Water Augmentation Project
- Maintenance and upgrading of conveyance facilities for capacity and stability.
- Maintenance of recharge facilities including de-vegetation, disking, deep ripping, and de-silting, as necessary to improve recharge potential.
- Replace at least two wells each year to help ensure the wells are efficient and have suitable water quality.

Planned Actions

None

9 - GROUNDWATER PLANNING AND MANAGEMENT

9.1 – Land-Use Planning

An important component of developing a Groundwater Management Plan is the review of land-use plans for the surrounding area or basin, and coordinating efforts with regional and local land-use planning agencies. Land-use planning activities in unincorporated areas of Fresno County are performed by the County of Fresno's Department of Public Works planning department, and overseen by the Fresno County Planning Commission. Responsibility for land-use planning in incorporated areas lies with each city's planning staff. The City of San Joaquin is the only urban development within the Plan Area, and its staff is responsible for land-use planning within its Sphere of Influence.

The intent of this Plan is not to dictate land-use planning policies, but rather to establish some land-use planning goals that can aid in protecting and preserving groundwater resources. The Plan Participants will comment on environmental documents for land-use related activities that may impact groundwater. They will also work cooperatively with other agencies to minimize adverse impacts to groundwater supplies and quality as a result of proposed land-use changes. Some specific land-use planning goals include: (1) preserving areas with high groundwater recharge potential for recharge activities; (2) protecting areas sensitive to groundwater contamination; (3) requiring hydrogeologic investigations, water master plans, and proven and sustainable water supplies for all new developments; and (4) requiring appropriate mitigation for any adverse impacts that land-use changes have on groundwater resources.

Existing Activities

- Notify residents and agencies of projects that have the potential to impact groundwater within their sphere of influence.
- When appropriate, comment on environmental documents and land-use plans that have the potential to impact groundwater.

Planned Actions

None

9.2 - Groundwater Reports

The City of San Joaquin has not historically prepared Annual Groundwater Reports, primarily due to their small size, limited water use, limited water supply data, and lack of available staff. However the City plans to improve groundwater monitoring and data collection, and develop an outline for a brief groundwater report or groundwater memorandum consistent with their needs. This groundwater memorandum will be completed prior to the Annual Groundwater Advisory Committee meeting and used during discussions with JID. The City will consider preparing a comprehensive Groundwater Report as they expand.

JID has a goal to prepare groundwater reports every year to document groundwater levels, available groundwater storage, historical trends, and other important groundwater related topics. This information will be used to forecast future problems, plan future groundwater projects, and develop new groundwater policies. The annual report will cover the prior calendar year and will be completed each year by April 30th. See **Attachment 5** for a report outline.

Existing Activities

- JID prepares a Water Management Plan every five years for the United States Bureau of Reclamation as a requirement to maintain their Central Valley Project water supply. The Water Management Plan includes sections on groundwater usage and groundwater projects.

Planned Actions

- Prepare an annual Groundwater Memorandum documenting the City's groundwater efforts and statistics including groundwater pumping, well construction, groundwater studies, groundwater quality data, and other pertinent information. As the City expands their groundwater monitoring and management efforts, the memorandum would evolve into an annual report as described below for JID.
- Prepare an annual JID Groundwater Report that will include the following:

    1. Groundwater level data;
    2. Groundwater contour maps and groundwater flow directions;
    3. Groundwater storage calculations;
    4. Evaluation of one-year and five-year historical trends in groundwater levels, contours, and storage, and perceived reasons for any changes;
    5. Evaluate the adequacy of monitoring efforts and monitoring protocols.
    6. Estimates of deliveries to recharge basins;
    7. Summary of important groundwater management actions;
    8. Discussion on whether management actions are meeting the management objectives;
    9. Summary of proposed management actions for the future;
    10. Summary of groundwater related actions taken by other regional groups;
    11. Recommendations for changes in the content or format of the annual report;
    12. Recommendations for updates to the GMP.

9.3 - Plan Implementation

Implementation of this updated GMP is expected to result in significant amounts of new knowledge and an achievable improvement in groundwater management in JID and the City of San Joaquin. **Attachment 6** includes an implementation schedule for this GMP from 2010-2015. The schedule does not include existing activities that will be continued, but rather documents new projects.

The goals listed in this GMP are considered reasonable and within the capabilities of the District and City. However, most of the goals will require some funding or staff time to achieve. Since staff time and funding are only available in finite quantities, and can often fluctuate, the Plan Participants must by necessity prioritize efforts and cannot guarantee that all of the goals will be accomplished. The Plan Participants recognizes the importance of groundwater management, and will make their best efforts to meet the goals outlined in this plan. If staff or funds are limited, then the projects in the implementation schedule will be prioritized. Plan implementation for the City will rely largely on grant funding.

9.4 - Plan Re-evaluation

The Groundwater Advisory Committee will be responsible for monitoring the progress in implementing the GMP objectives. Refer to Section 4.1 for more information on the membership, policies, and procedures of the Committee. The Committee will attempt to meet at least once a year to review and evaluate groundwater conditions as well as evaluate the effectiveness of the GMP. As new policies, practices, and ordinances become necessary or desirable to enhance the management of the local groundwater supply, this Plan will be amended as necessary.

Existing Activities

None

Planned Actions

- Update the GMP at least every five years, or more frequently if deemed appropriate.
- Evaluate the effectiveness of the GMP and need for an update at the annual Groundwater Advisory Committee meetings.
- Document recommendations for improving or updating the GMP in each annual Groundwater Report.

9.5 - Dispute Resolution

Dispute resolution is addressed in JID through the District's *Rules and Regulations Governing Water Distribution and Canal Maintenance* as follows:

> "*When Landowners/Water Users cannot resolve differences or controversies with the Ditchtender, the Superintendent or Assistant Superintendent, they are expected to discuss the problem with the Manager prior to asking the Board of Directors for final determination. Unresolved disputes must be presented in writing to the Board of Directors. The Board of Directors will take no action until a written complaint is received. The Board of Directors reserves the authority to act as the final level of appeal on differences and controversies between Water Users and District employees*." (pg 9-10)

If necessary, the District Manager may also use legal counsel or technical consultants to assist in addressing disputes. In addition, the Districts participation in numerous multi-agency organizations (see Section 4.2 - Relationships with Other Agencies)

provides several forums and dispute resolution mechanisms when issues arise between different agencies. No groundwater disputes have occurred in JID in recent years.

The City of San Joaquin does not have special procedures for groundwater disputes, but rather they would be handled through standard dispute resolution processes. These would involve contacting the Department of Public Works, and if necessary meeting with the City Manager or the City Council.

Several mechanisms are also available for resolving regional groundwater disputes through agencies such as KRCD, KRWA, and SLDMWA. The Lower Kings Basin Groundwater Management Plan Update also includes a discussion on the resolution of regional groundwater disputes.

Existing Activities

- Resolve groundwater disputes through general dispute resolution procedures.

Planned Actions

- Discuss issues of concern at the annual GAC meetings in an effort to prevent future disputes.

9.6 - Program Funding and Fees

Several alternatives are available to the City and JID for funding groundwater projects, and are described below:

Water Replenishment Fees

Under AB3030, local agencies have the authority to limit groundwater extractions and implement water replenishment fees based upon the amount of water extracted (extraction based fees must first be approved by majority vote of impacted landowners). Inherent in these powers is the authority to implement metering of private wells. These are considered measures of last resort and the Plan Participants will make any and all efforts to ensure the private, non-metered use of groundwater by the local growers.

Capital Improvement Fees

The District has the authority to finance capital improvement projects and collect repayment charges from the benefited parties. This process would require a favorable vote from the constituency, and is considered a realistic alternative for large capital projects, such as groundwater recharge or banking projects. The City also has several mechanisms to finance long-term capital projects, and collect revenue through water user fees.

Grants and Loans

The Plan Participants will pursue available grants and low-interest loans from the Department of Water Resources as well as other State and Federal agencies. The District and City will also seek opportunities to jointly submit grant and loan applications.

The District and City realizes that funding from State and Federal agencies for groundwater projects will be partially based on their progress in implementing this GMP.

Groundwater Banking Fees

JID is currently developing a groundwater bank that will be partially used to store water for other agencies. The revenue generated from operating the bank could be reinvested into other groundwater projects.

Other Revenue Sources

Groundwater projects can also be financed through water user fees and assessments that are collected regularly from all landowners.

Exiting Activities

- Regularly research grant and loan opportunities from the State and Federal government.

Planned Actions

- Identify beneficial groundwater projects that become economically feasible when costs are shared among two or more participants.
- Seek funding for projects that could benefit both the City and District.

10 - REFERENCES

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JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX G

WATER BANKING PROGRAM PROSPECTUS

JAMES IRRIGATION DISTRICT

Incorporated February 16, 1920

8749 Ninth Street
Post Office Box 757
San Joaquin, California 93660-0757

John Mallyon, Manager
Donna Hanneman, Secretary

Telephone: (559) 693-4356
Facsimile: (559) 693-4357

Water Banking Program Prospectus

Overview

The following is a solicitation of interest in purchasing a long-term water supply or water banking services from the James Irrigation District. Those interested should immediately contact Richard M. Moss, California, at (559) 636-1166. As you will read, the James Irrigation District is uniquely positioned from a geographic, hydrologic and water rights entitlement/contractual basis to offer water banking services to others as well as to offer water generated from the District's own banking program for sale on a long-term basis to willing purchasers throughout California.

Description of District

The James Irrigation District is an agricultural water purveyor located in the heart of the San Joaquin Valley near the town of San Joaquin, 25 miles southwest of Fresno in California. The District has been in formal operation since 1920 with predecessor interests dating back to the mid-1800's. The 26,000-acre (23,000 acres irrigated) district is farmed primarily to row crops, cotton, alfalfa and seed alfalfa. More recently, many acres of almonds have been planted in the District. It has a mixture of soil types ranging from light (sandy) textured soils on the eastern side of the District to very heavy clay soils for much of the central and western part of the District.

The District is underlain with a good quality groundwater aquifer with capacity to store an estimated 1.5 million acre-feet of water. The District is located near the "trough" of the San Joaquin Valley and sits between the Fresno Slough, the northern most distributary of the Kings River, and the James Bypass, the floodway that transports Kings River floodwaters to Mendota Pool and the San Joaquin River. The District can pump water from or deliver water to the Mendota Pool, an operational reservoir located on the San Joaquin River near the town of Mendota, which is also the terminus of the federal Central Valley Project (CVP) Delta-Mendota Canal and the headworks for the historic diversions from the San Joaquin River by the San Joaquin River Exchange Contractors (which hold some of the oldest and firmest water rights in the state). In some respects the Mendota Pool serves as a "switchyard" for water and water transactions with some of the most senior water rights holders in the state and some of the more junior water rights holders in the state receiving water directly or indirectly from Mendota Pool, as well having the ability to receive water from the San Joaquin River, the Kings River, the federal CVP and the California State Water Project. On the average, more than 1.5 million acre-feet of water pass through Mendota Pool every year.

The James Irrigation District has available to it several different water sources, including:

- A good quality groundwater aquifer with a dedicated well field and overlying and deeded rights to groundwater extraction within and outside of the District's boundaries. The District currently owns and operates 58 wells and deep well turbine pumps;

- Water rights to the Kings River granting it access to floodwater;

- The ability to contract for floodwater from the San Joaquin River via the CVP's Friant Division (with delivery through the Friant-Kern Canal and the Kings River) or to take San Joaquin River floodwater reaching Mendota Pool;

- The ability to contract for surplus CVP water made available from the Delta-Mendota Canal and Mendota Pool;

- A perpetual right (in settlement of water rights issues, called "Schedule 2 Water") to 9,700 acre-feet of CVP water made available from the Delta-Mendota Canal and Mendota Pool subject only to an approximately 22 percent shortage in certain (infrequent) critically dry years for the Sacramento River; and

- Contractual entitlement to 35,300 acre-feet of CVP water via a long-term water service contract subject to CVP agricultural water shortages from the CVP's Mendota Pool Unit.

It is this unique combination of access and rights to various water resources and equally unique geographical setting that allows James Irrigation District to provide water banking services using its groundwater reservoir and extraction wells and/or to make a water supply available for sale to others.

How is James Irrigation District Able to Make Water Available in a Dry Year?

James Irrigation District has embarked on an aggressive program of construction of direct groundwater recharge facilities (sinking basins) and groundwater wells and pumps. It intends to use these new facilities to generate new yield for use within the District by capturing available floodwater from either the Kings or San Joaquin rivers or other sources. Some of the additional yield from this new groundwater storage capability will be exchanged for the District's surface water to facilitate the sale of banked floodwater. The District has constructed a major new groundwater recharge facility and has validated on a large-scale basis the technical and policy foundation upon which the Water Sales portion of the Program is based. The balance of the needed construction of new facilities (groundwater wells) will commence with the finalization of water sales or banking agreement(s).

The third party Water Banking portion of the Program will operated by the District taking surface water deliveries from its banking customer either for direct recharge or by using

the existing distribution system to offset use by the District's water users at times they would otherwise be using their groundwater. The inverse of these operations will occur when water is to be returned to the District's Water Banking customers.

Sale of New Yield from Banking Facilities

James Irrigation District is offering a portion of the new water supplies produced through its banking program for long-term sale. This water is significantly differentiated by its relative firmness of availability. This supply is some of the most reliable water in California, and is even more reliable than Municipal and Industrial water supplies available by way of water service contract from the CVP.

Quantity - James Irrigation has available for sale up to 1,250 acre-feet per year of surface water supply produced through its banking program to be made available at O'Neill Forebay.

Term - The James Irrigation District is interested in providing a long-term program of banked water sales for the term of its CVP long-term contract water supply and renewals thereof.

Price – The price of the water is split into two components: (i) an initial one-time payment for each acre-foot of annual entitlement to be purchased of $450 per acre-foot, and (ii) an annual charge of $450 per acre-foot for each acre-foot of entitlement to be purchased (to be paid annually regardless of how much water is actually delivered). The annual charge will be adjusted annually using the All Urban Consumers, All Items Index, Western Cities with populations between 50,000 and 1,500,000 (CPI-U) as an index with the November 2007 CPI-U as its base over the term of the contract(s). Once purchased, this water supply will be available to the buyer for as long as the District retains its water service contract with the Bureau of Reclamation, up until 2054.

Other terms of sale such as build-up provisions, return of unused water, etc. of significance should be noted and flagged for negotiation early as part of the potential buyers' indication of interest.

Such supplies would be available every year, unless and to the extent the District's Schedule 2 water supply of at least 7,600 acre-feet is not made available to the District (which to date has never occurred).

Water Banking Services

James Irrigation District is also offering water banking or firming services using water supplied by banking partner(s). Much like the firm ability to provide water banked by the District itself for sale, water supplied by a partner and banked with the District can be returned in even the driest of years.

Quantity - James Irrigation District has available for return as part of its Water Banking Program up to 1,250 acre-feet per year of surface water supply to be made available at O'Neill Forebay. Water to be banked with James Irrigation District must be made

available at the District's turnout from the Mendota Pool or at other locations agreeable to the District. All costs of providing the water to be banked are to be borne by the banking partner. Water to be banked with James Irrigation District must be made available at times acceptable to the District. The original banked water quantity put with the District will be reduced by ten (10) percent to account for spreading, aquifer and any other losses and related mitigation..

Term - The James Irrigation District is interested in providing a long-term program of water banking for a term of twenty-five (25) years. The water banking program may be renewed upon terms and conditions mutually agreeable to the parties. Any water remaining in the Water Bank at the end of the term will become the asset of the James Irrigation District unless there is a renewal agreement that specifically addresses existing water supplies already in the bank.

Price - The price of the banking service is split into three (3) components: (i) an initial one-time payment of $1,750 per acre-foot of annual return capacity, (ii) a $30 per acre-foot fee when each acre-foot is actually placed into the Water Bank, and (iii) a $30 per acre-foot fee when each acre-foot is returned from the Water Bank. The placement and return charges will be adjusted annually in using the All Urban Consumers, All Items Index, Western Cities with populations between 50,000 and 1,500,000 (CPI-U) as an index with the November 2007 CPI-U as its base over the term of the contract(s). There is no limit to how much water can be placed and subsequently returned, only a limit (three times the annual return capacity purchased) that can be stored in the bank at any one time (see Banking Capacity below). It should be noted that the costs to be paid to James Irrigation District are in addition to any operation and maintenance (O&M) costs associated with operating the Water Bank including the O&M costs for a portion of the District's distribution system, groundwater recharge system and groundwater extraction system. This cost is currently estimated to be $18 per acre-foot for annual O&M plus an additional $45 per acre-foot energy charge in years when groundwater extraction occurs on behalf of the banking partner. These charges will be adjusted annually to reflect actual costs.

Banking Capacity – Three (3) acre-feet of storage capacity within the James Irrigation District's groundwater reservoir for each acre-foot of annual return capacity will be provided by the District.

<u>District Goals</u>

The District's Program has some fundamental underlying goals:

- The Program must generate significant, quantifiable benefits to the District and its landowners;

- The Program should not have any significant adverse impacts (short-term or long-term) on the District, its landowners or any third parties. This includes impacts to local groundwater supplies; and

- The Program should not have any adverse implications on the District's ability to continue to receive water (or the benefits of that water) under its existing water or contract rights.

The Program (or any portion of it) will not be pursued unless it meets those goals.

It should also be noted that James Irrigation District might pursue an expansion of this initial offering or other such programs. While the commitments made pursuant to this Program are intended to be kept, there is no intention of priority associated with this Program over other programs the District is currently involved with or may become involved with in the future.

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX H

GROUNDWATER QUALITY DATA

JAMES IRRIGATION DISTRICT WELL PUMPS REPORT

WELL WATER QUALITY TESTS 2014

TOTAL DISSOLVED SOLIDS / PARTS PER MILLION

LOCATION	STATUS	YEAR >> WELL #	2014 PPM	2013 PPM	2012 PPM	2011 PPM	2010 PPM	2009 PPM	2008 PPM	2007 PPM	2006 PPM	2005 PPM	2004 PPM	2003 PPM	2002 PPM	2001 PPM	2000 PPM	1999 PPM	1998 PPM	1997 PPM	1996 PPM	1995 PPM	1994 PPM	1993 PPM	1992 PPM	1991 PPM	1990 PPM	1989 PPM	1988 PPM	1987 PPM	1986 PPM	1985 PPM	1984 PPM	1983 PPM	1982 PPM	1981 PPM	1980 PPM	1979 PPM	1978 PPM	1977 PPM	AVG
COALINGA	ABANDONED	C-49																								A	1,025	1,000	800		775	700		700	625	650				784
COALINGA	ABANDONED	C-53																A	350	350				400		350	325	300	250		200	400		300	250	250				310
COALINGA	ABANDONED	C-54																					A	300		250		250	200		175	300		200	200	225				233
MAIN CANAL		C-55	1,375	1,325	1,450	N/T	1,200	1,200	1,275	1,200		1,325	1,200	1,100	1,300	1,200	1,300	1,300		1,300	1,275			1,100	1,200	1,150	1,225	1,250	1,250	1,000		1,100	1,050		1,100	1,125	1,150			1,250	1,216
MAIN CANAL		C-56	1,200	1,200	1,100	N/T	1,000	1,100	1,100	1,075		1,150	1,100	1,000	1,150	1,100	1,150	1,200		1,200	1,125			1,000	1,100	1,100	1,075	1,050	1,075			950	900		1,000	975	1,000			1,050	1,079
COALINGA	ABANDONED	C-57												A	1,275	1,300	1,400	1,500		1,000	550				450		425		500			300	300		225	250	225				693
KERMAN		C-58	750	800	800	N/T	650	650	650	575	900	800	575	550	575	625	625	650		900	850			250	575		525	550	775			800	800		800	500	900				681
KERMAN	ABANDONED	C-59							A	1,600	1,450	1,675	1,400	1,400	1,600	1,700	1,700	1,800		1,750	1,750			700	1,250		1,300	1,200	1,250	1,000		980	1,100		1,100	9,000	1,000				1,714
KERMAN		C-60	1,000	975	850	N/T	825	825	900	850	850	900	750	700	700	825	850	850		850	850			650	750		700	675	750			575	600		600	550	600				770
COALINGA		C-61		850	975	N/T	750	725	800	800	850	800	675	800	800	825	850	850		750	750			600	550		750	725	600	500		400	300		350	275	275				673
KERMAN		C-62	2,200	2,150	1,550	N/T	1,625	1,750	1,825	1,875	2,000	2,000	1,750	1,500	1,700	1,800	2,050	1,950		2,000	2,150			1,500	1,450		1,725	1,500	1,650			1,300	1,300		1,325	1,300	1,550				1,721
MAIN CANAL	ABANDONED	C-63																	A	350				350	350		325	300	300	250	225	225	250		250	260	300			275	286
MAIN CANAL	ABANDONED	C-64																													A	1,400			1,400	1,380	1,380			1,200	1,352
MAIN CANAL		C-65	1,050	1,000	850	N/T	950	950	1,000	950		1,050	1,000	950	900	1,000	1,050	1,075		1,050	1,075			1,000	1,025		1,175	1,200	1,250			1,100	1,100		1,200	1,000	1,025				1,038
MAIN CANAL	ABANDONED	C-66																																	A	1,090			1,025	1,058
KERMAN		C-67	1,000	1,025	1,125	N/T	1,200	850	1,100	850	1,225	1,000	850	1,250	825	1,100	1,350	1,300		1,500	1,500				975		950	925	1,300			925	1,200		1,275	1,000	1,300				1,112
MAIN CANAL		C-68	1,075	1,000	900	N/T	925	1,000	1,050	1,000		1,100	1,000	900	1,050	950	1,000	1,050		1,000	1,000			1,100	950		1,000	1,000	1,000	800					900	920	950			1,000	985
COALINGA		C-69	500	550	550	N/T	400	400	400	300	350	350	325	300	325	350	325	300		300	250			300	300		275	225	250	200		150	250		175	175	175				313
COALINGA		C-70	3,475	3,050	2,950	N/T	2,500	2,400	2,900	2,800		2,750	2,500	1,350	2,700	2,700	2,800	2,700		2,450	2,400				1,650		1,450		1,500			1,000	1,000		700	600	625				2,123
COALINGA		C-71	450	500	550	N/T	475	475	525	425		550	475	450	450	500	450	450		400	350				350		325		250	200		175	200		175	200	200				382
COALINGA		C-72	475	500	525	N/T	450	500	575	475		650	550	525	550	550	525	500		450	475				450		375		300	250		175	200		200	225	225				427
MAIN CANAL		C-73	500	500	500	N/T	500	500	500	375	500	550	450	450	475	475	500	500		550	600			600	500		475	500	450	400	350	400	400		400	400	425			450	473
COALINGA		C-74	700	650	725	N/T	P	575	575	450	500	525	450	500	500	500	450	450		400	375				400		300		850	800		150	250		175	200	180				465
MAIN CANAL	ABANDONED	C-75													A	750	1,000	1,025		1,000	1,025			900	900		900	650	850	800		700	700		700	800	780			900	846
MAIN CANAL		C-76	450	450	375	N/T	500	400	450	225	400	425	400	400	375	375	350	350		350	325			350	350		300	450	300	250	230	250	250		250	250	300			300	348
COALINGA		C-77	650	650	650	N/T	525	525	550	450		500	450	475	450	450	400	400		350	325			300	325		250	250	250	200		125	250		200	200	200				383
COALINGA		C-78	400	325	300	N/T	250	275	300	150	175	225	225	200	225	200	200	200		200	200			250	225		200	200	200			150	250		175	175	175				224
COALINGA		C-79	1,200	1,125	1,025	N/T	900	925	900	750	800	875	675	650	700	725	650	700		600	650				550		450	425	400	350		300	300		325	325	325				652
COALINGA		C-80	400	325	300	N/T	275	275	275	175	200	200	225	200	150	250	200	200		200	175			200	225		200	175	200			125	250		175	200					222
MAIN CANAL		C-81	1,075	1,025	1,000	N/T	1,000	1,000	1,025	950	1,000	1,100	950	900	1,000	950	950	900		850	850			600	900		900	900	850	800		875	700		700						913
COALINGA		C-82	750	700	550	N/T	675	675	700	575	600	650	625	550	600	600	525	500		500	475				450		350														582
COALINGA		C-83	450	425	375	N/T	350	300	375	250	200	225	275	250	250	250	200	225																							293
KERMAN		C-84	500	450	475	N/T	450	450	425	300	400	450	400	400	400	400	375	375																							417
COALINGA		C-85	1,300	925	975	N/T	675	750	900	650	750	750	500	400	375	350	275	275																							657
MAIN CANAL	ABANDONED	C-86					A	750	800	625	675	800	750		750	775	750																								742
MAIN CANAL		C-87	875	825	700	N/T	800	850	875	750		850	850	800	800																											816
COALING		C-88	300	425	450	N/T	300	375	350	200	250	225	275	200																											305
COALINGA		C-89	250	275	250	N/T	200	200	250	125	175	180	200																												211
MAIN CANAL	ABANDONED	D-04																							A	450	450	350	400	275	325	350		400	375	500			475	395
KERMAN	ABANDONED	D-06																					A	400		375	350	400	300		300	400		400	350	475				375
MAIN CANAL	ABANDONED	D-08										A	500	450	475	500	475	500		450	450			450	450		400		400	300	250	325	300		300	300	300			300	394
MAIN CANAL	ABANDONED	D-09																	A	525				400			425	875	400	300	300	325	300		350	325	300			350	398
MAIN CANAL	ABANDONED	D-10										A	500	400	450	450	450	500		500	450				450		400	450	400	300	280	325	400		350	350	375			375	408
MAIN CANAL		D-15	925	950	750	N/T	900	900	900	850	850	950	850	700	800	850	850	900		950	900			800	750		750	750	700	700		625	700		700	600	690			650	800
KERMAN	ABANDONED	D-16																	A	350	375			400	450		375	950	950	900		225	250		300	300	300				471
KERMAN	ABANDONED	D-17																												A		550	800		700	500	625				635
MAIN CANAL	ABANDONED	D-21																													A	1,000			1,000	900	980			900	956
KERMAN	ABANDONED	D-22																												A	825	800		800	1,000	850				855
KERMAN	ABANDONED	D-23																												A	875	850		900	750	875				850
MAIN CANAL	ABANDONED	D-24														A	850	900		1,000	1,050				1,300		975	1,200	900	900		825	1,000		1,100	850	1,150			925	995
MAIN CANAL	ABANDONED	D-25																																	A	700	750			800	750
MAIN CANAL		D-29	1,350	1,350	1,400	N/T	1,200	1,200	1,250	1,250		1,400	1,250		1,400	1,350	1,400	1,400		1,400	1,400			1,300	1,300	1,400	1,350	1,350	1,375			1,200	1,200		1,200	1,225	1,250			1,350	1,315
MAIN CANAL		D-30	475	450	400	N/T	450	450	450	300		475	400	400	400	400	400	400		400	500				400		350	350	300	300	230	250	225		250	250	275			275	364
KERMAN		D-31	400	375	400	N/T	350	325	325	275	325	350	250	300	300	325	300	300		300	350				300		250	250	250	200		175	200		225	250	250				293
COALINGA		D-32	550	500	525	N/T	525	500	550	700	450	525	500	450	525	500	500	450		450	650				475		400	375	350	300		225	200		250	250	275				443
COALINGA		D-33	2,200	Pending	2,800	N/T	1,400	1,625	1,600	1,475		1,275	1,125	1,050	1,025	950	850	1,000		700	800				650		550	500	450	350		275	300		250	250	225				947
COALINGA		D-34	675	700	700	N/T	600	625	750	575	650	650	600	550	600	600	575	600		550	600				525		450	450	450	400		350	350		350	400	400				545
COALINGA		D-35	750	700	525	N/T	650	675	900	575	675	675	650	600		675	650	625		600	625				575		475	500	450	400		325	300		350	350	375				563
COALINGA	ABANDONED	D-36													A	400	350	400		350	275			300	300		300	225	250			200	250		175	175	200				277
INSIDE	ABANDONED	D-37			A	N/T	1,000	1,000	1,075	1,100	1,100	1,250	1,150	1,050	1,050	1,050	1,000	1,000		950	950				950	775	725	700	1,200			900	600		1,200	675					976
MAIN CANAL		D-38	1,025	1,050	1,100	N/T	950	1,000	1,025	975		1,050	1,025	1,000	1,100	1,100	1,100	1,125		1,100	1,150			1,000	1,050	1,125	1,100	1,100	1,100			900	1,000		1,000						1,050
MAIN CANAL		D-39	1,100	1,075	1,150	N/T	1,000	1,000	1,050	1,000		1,075	1,025	1,000	1,150	1,100	1,125	1,175		1,200	1,200			1,400	1,175		1,425		1,700	1,500		1,500									1,188
MAIN CANAL		D-40	1,000	900	700	N/T	900	900	950	875	900	1,125	950	1,000	950	950	950	1,025		1,000	1,000			900	850		875	850	850			850									924
KERMAN		D-41	1,675	1,625	1,300	N/T	1,450	1,450	1,400	1,450	1,750	1,650	1,450	1,300	1,500	1,550	1,500	1,550		1,450	1,700			1,200	1,150		1,100	1,050	1,000	900											1,398
KERMAN	ABANDONED	D-42						A	1,225	1,000	900	975	950	850	925	1,050	1,000	1,050		1,000	1,000			900	975		900	875	1,175	700											969
KERMAN		D-43	1,300	1,175	1,150	N/T	1,000	1,100	1,075	950	900	1,100	1,025	1,050	1,100	1,075	975	800		750	750			700	750		600	550	550	500											910
INSIDE	ABANDONED	D-44															A	1,500		1,750	1,775				1,500	1,275	1,150	1,025												1,425
INSIDE	ABANDONED	D-45																	A	2,500	2,500				1,725	1,675	1,725													2,025
INSIDE		D-46	350	350	350	N/T	350	325	375	275	325	325	325	300	300	300	350	350		350	350				350															333
INSIDE	ABANDONED	D-47			A	N/T	725	900	750	650	700	900	650	600	650	600	600	625		600	800				500															683
MAIN CANAL		D-48	350	350	300	N/T	350	325	350	225	300	325	300	275	300	300	300	325		300	300			300	300															309
KERMAN		D-49	1,300	1,250	1,000	N/T	1,175	1,200		1,250	1,200	1,425	1,300	1,300	1,325	1,325	1,250			1,100	1,225			1,250																1,242
KERMAN		D-50	450	400	450	N/T	375	375	350	375	325	350	325	300	325	350	350	350		350	350			400																364
COALINGA		D-51	475	425	450	N/T	375	350	400	250		350	325	300	325	325	300	300		300	275																			345
KERMAN		D-52	1,200	1,050	950	N/T	1,050	1,100	1,100	1,000	1,175	1,225	1,000	1,000	1,100	1,100	1,200			1,050	1,100																			1,088
COALINGA		D-53	1,625	1,425	1,675	N/T	1,125	1,200	1,450	1,350		1,550	1,000	1,250	725	750	900	1,000		600	400																			1,127
MAIN CANAL		D-54	325	350	300	N/T	350	375	350	225	325	425	350	300	325	325	325	350		400																				338
MAIN CANAL		D-55	400	375	325	N/T	375	400	400	275	325	375	350	300	350	350	350	375		400																				358
INSIDE		D-56	1,000	800	800	N/T	700	725	800	675	725	900	700	800	700	650																								767
KERMAN		D-57	550	550	575	N/T	525	525	575	450	500	650																												544
MAIN CANAL		D-58	400	375	350	N/T	375	375	400	300	350	375																												367
KBSN RECOVRY		D-59		400	450	N/T	375	350																																394
KBSN RECOVRY		D-60		500	600	N/T	650	800	850																															680
COALINGA		D-61	400	425	350	N/T	Legal																																	392
COALINGA		D-62	600	550	600	N/T	525	575																																570
COALINGA		D-63	700	600	650	N/T	550	525																																605
COALINGA		D-64		Pending	N/T	N/T	Pending																																	0
KBSN RECOVRY		D-65	900	850	800	N/T	900																																	863
KBSN RECOVRY		D-66	825	800	800	N/T	850																																	819
KBSN RECOVRY		D-67	1,050	975	950	N/T	1,000																																	994
KBSN RECOVRY		D-68	950	950	900	N/T	1,050																																	963

JAMES IRRIGATION DISTRICT WELL PUMPS REPORT

WELL WATER QUALITY TESTS 2014

TOTAL DISSOLVED SOLIDS / PARTS PER MILLION

LOCATION	STATUS	YEAR >> WELL #	2014 PPM	2013 PPM	2012 PPM	2011 PPM	2010 PPM	2009 PPM	2008 PPM	2007 PPM	2006 PPM	2005 PPM	2004 PPM	2003 PPM	2002 PPM	2001 PPM	2000 PPM	1999 PPM	1998 PPM	1997 PPM	1996 PPM	1995 PPM	1994 PPM	1993 PPM	1992 PPM	1991 PPM	1990 PPM	1989 PPM	1988 PPM	1987 PPM	1986 PPM	1985 PPM	1984 PPM	1983 PPM	1982 PPM	1981 PPM	1980 PPM	1979 PPM	1978 PPM	1977 PPM	AVG
INSIDE		D-69	325	300	300																																			308
INSIDE		D-70	425	325	350																																			367
INSIDE		D-71	300	300	300																																			300
INSIDE		D-72	350	350	375																																			358
AVERAGE			841.667	767.308	767.803		749.597	747.083	807.456	731.466	690.476	833.276	735.776	691.364	770.089	772.845	784.052	793.750	0.000	817.241	824.569	0.000	0.000	710.606	712.963	1214.286	686.792	697.159	702.941	519.444	267.500	541.100	569.500	0.000	580.882	689.700	589.796	0.000	0.000	728.947	
TOTAL WELLS TESTED			63	65	66		62	60	57	58	42	58	58	55	56	58	58	56	0	58	58	0	0	33	54	7	53	44	51	36	8	50	50	0	51	50	49	0	0	19	
A = ABANDONED 28			0	0	2	0	1	1	1	0	0	2	0	1	2	1	1	0	3	2	0	0	0	2	0	1	1	0	0	0	3	2	0	0	1	1	0	0	0	0	28
																			^^^^^												^^^^^									

P = PENDING; REPAIRS / REPLACEMENT IN PROCESS

N/T = NOT TESTED

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX I

JAMES IRRIGATION DISTRICT NEWSLETTER

JAMES IRRIGATION DISTRICT

Looking Upstream

Winter 2013-14 *A Review of District Water News* Volume 17, No. 1

Drought Leaves CVP Supply In The Dust

James Is Relying On Wellfields As Valley's Water Crisis Grows

One of California's most severe droughts ever has made it official — that James Irrigation District will receive no Central Valley Project water this year.

Now JID and its growers are hoping the wells don't run dry, too.

"These are going to be very difficult times," says John Mallyon, JID Manager. "We're sitting here with an empty bucket."

The formal U.S. Bureau of Reclamation declaration came as no surprise.

For months James and other contractors in the

(Continued on Page 2)

Water Woes To Be March 14 Lunch Topic

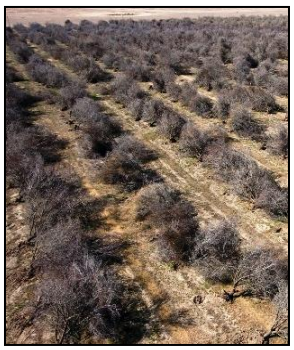
This year's lack of water supply will be the main topic when James Irrigation District growers meet for JID's annual grower meeting and luncheon.

It is set for 12 noon Friday, March 14, at JID's office in San Joaquin.

Please RSVP by calling 693-4356.

President Gets Look At Impacts

President Obama may have skipped the James Irrigation District during his West Side visit February 14 but he heard an earful on the drought's Central Valley Project devastation.



Almond trees being ripped out in the neighboring Westlands Water District as land is falllowed because of the crippling lack of water. President Obama viewed such sad scenes while flying by helicopter over the West Side on February 14.

The President made an aerial inspection over parts of the West Side before landing 17 miles west of Firebaugh for a

(Continued on Page 2)

JAMES IRRIGATION DISTRICT

Incorporated February 16, 1920

8749 Ninth Street
Post Office Box 757
San Joaquin, CA 93660

Telephone: (559) 693-4356
Fax: (559) 693-4357

IRRIGATED LANDS REGULATORY PROGRAM

May 19 Signup Deadline Looms

Growers in the James Irrigation District have until May 19 to take perhaps the most important steps to comply with new water quality protection mandates.

The Central California Regional Water Quality Control Board's Irrigated Lands Regulatory Program Tulare Lake Basin General Order covers James.

Under its provisions, the Regional Board considers any land being irrigated to have potential to discharge into groundwater.

All irrigated parcels, regardless of size, must comply with the Regional Board's requirements.

To Learn More

Visit the Kings River Water Quality Coalition website:

www.kingsriverwqc.org

Or call 365-7958.

The May 19 deadline is a requirement for growers or farm operators to join the Kings River Water Quality Coalition and enroll all irrigated parcels for coverage.

The alternative is to sign up directly with the Regional Board, a state agency, but fees for individual compliance will be significantly greater than the cost of Coalition membership.

The Coalition was organized by Kings River interests to support growers. The Regional Board is the enforcing agency.

Irrigated lands can also be covered through an individual discharge permit but fees would be higher and individuals would bear costs of monitoring and reporting.

Regional Board adoption of the Tulare Lake Basin order came last year.

Board officials warn that failure to participate could lead to administrative penalties on landowners of $1,000 per day.

Briefly

NEW DIRECTOR

- **James Irrigation District has** a new Board member. Riley Chaney was appointed to fill the remaining two years of the term of long-time Director Kenny Hale, who retired last year. Chaney grows almonds, cotton, seed alfalfa, onions and tomatoes.

DITCHTENDERS

- **Two new ditchtenders are on** the job and serving the James Irrigation District. Victor Rodriguez joined the JID team in October while Eric Groppetti came on board in November.

RIVER RESTORATION

- **San Joaquin River Restoration** Program interim flows have been halted a few weeks before they would otherwise would have been stopped by drought conditions, saving 12,500 acre-feet of water. The Fresno Irrigation District is banking the water for the Bureau of Reclamation. It will be used as an emergency municipal supply in the Friant Division, which may receive no Central Valley Project supply this year.

James, Tranquillity Seek New Kings Agreement Talks

The James and Tranquillity irrigation districts have notified other lower Kings River units of their intention to renegotiate a water use agreement due to expire in December 2015.

JID Manager John Mallyon said since the present agreement was enacted in 2003, water supply situations have worsened and a number of important facilities changes have been made.

"We have to maximize our water supply abilities," he said.

Obama

(Continued from front page)

meeting with water, agricultural and civic leaders as well as a tour of the Joe Del Bosque ranch and its ground fallowed because of a lack of water.

Accompanying the President on the aerial tour were Rep. Jim Costa and U.S. Senators Dianne Feinstein and Barbara Boxer. Governor Brown joined the President for the West Side sessions.

Before Obama arrived in Fresno, the administration announced it expects to provide California producers an estimated $100 million for 2014 losses and up to $50 million for losses in previous years.

"Our goal here is to provide growers help and assistance," Agriculture Secretary Tom Vilsack told reporters.

There were no pledges of more water. Those present at the meeting said Obama was briefed on the value of the valley's agriculture and shrunken water supply's negative impact on growers, farm workers, support businesses and food supplies and prices. Water infrastructure needs and endangered species concerns were also voiced.

Nisei Farmers League President Manuel Cunha said later in an interview, "The President flying over this valley really started to see the impact."

President Obama views the drought parched West Side through the window of his Marine One helicopter on February 14.

JID To Rely On Wells

(Continued from front page)

federal CVP systems have been anticipating they would receive no water this year, even if average precipitation were to occur (which hasn't come close to happening).

Making matters worse, Reclamation announced February 15 that the San Joaquin River dry-year Exchange Contractors riparian supply of 75% cannot now be achieved. The Bureau stated that it can only allocate a 40% supply, or 336,000 acre-feet because of reduced Shasta Lake inflows. The result is almost certain to be a first-ever "call" for release of the Exchange Contractor's historic San Joaquin River water from Friant Dam.

Although James has a small amount of rescheduled CVP water in storage at San Luis Reservoir, Mallyon said the District currently has no choice but to put the burden on JID's system of wells in a pair of wellfields east of San Joaquin.

"Our wells have been taking a real beating since we started water deliveries in mid-January," Mallyon said. "That's pretty much our supply."

The District hopes to be able to offer water service through the summer.

To do so, Mallyon said, JID will need to bank some water in Mendota Pool to ensure an adequate supply will be available during the peak water use months. The wellfields are not capable of meeting the District's peak demands.

San Joaquin Rain Total Is Miniscule

James Irrigation District's surface supply isn't all that's extremely short this year.

Effective precipitation at the JID office in San Joaquin since July 1, 2013, amounts to only about one inch.

James, FID Partnering On Banking

A groundwater recharge and banking project aimed at improving conditions east of San Joaquin has received a major grant award that will move the work planned by the James and Fresno irrigation districts toward reality.

The Upper Kings Basin Integrated Regional Water Management Authority, in which both districts participate, has received $3.4 million in Proposition 84 funds for the first phase in the Southwest Groundwater Banking Project. The joint JID-FID project has a cost share of $1.16 million.

The project seeks to halt and ultimately reverse the critical groundwater overdraft problem in and around the Raisin City Water District. Unused regional floodwater supplies available to FID are to be utilized and imported into the Raisin City area – which has no existing surface water availability but is heavily developed for agriculture.

The project, initially 60 acres, is to be developed about six miles south of Kerman between the two districts. It will permit existing James surface supplies to be made available for exchange or to extend the water delivery season.

The ultimate project is to create an average annual water supply of up to 15,000 acre-feet.

Debate Continues Over Water Bond

State legislators are continuing to debate a variety of bills that would reconfigure and trim an $11.2 billion water infrastructure due to appear on the November ballot.

The need for new surface storage remains the key issue.

If a new bond does not emerge, the measure originally enacted in 2009 but twice delayed will go before voters.

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX J

AGENDA FROM 2014 ANNUAL GROWER'S MEETING

JAMES IRRIGATION DISTRICT

INCORPORATED FEBRUARY 16, 1920

ANNUAL MEETING

AGENDA

Friday, March 14, 2014, 1:00 p.m.

8749 9th Street, San Joaquin, California 93660

Telephone (559) 693-4356

Americans With Disabilities Act

A person with a qualifying disability under the Americans With Disabilities Act of 1990 may request the District provide a disability-related modification or accommodation in order to participate in any public meeting of the District. Such assistance includes appropriate alternative formats for the agendas and agenda packets used for any public meetings of the District. Requests for such assistance and for agendas and agenda packets shall be made in person, by telephone, facsimile or written correspondence to John Mallyon, General Manager, at the District office, at least 48 hours before a public District meeting.

I. **CALL TO ORDER**

II. **OTHER BUSINESS / PUBLIC COMMENTS**

III. **DISTRICT ELECTIONS**

IV. **BAY-DELTA ISSUES / BAY-DELTA CONSERVATION PLAN**

V. **WATER SUPPLY: 2014**

- A. U.S.B.R. / Central Valley Project Allocation
- B. Riparian Rights / Schedule II
- C. District Water Supply Forecast: 2014-2015
- D. James Irrigation District "Application for Water Service" - Due March 1, 2014
- E. Winter Deliveries - Discuss requests for winter deliveries, logistical problems of being able to provide water, billing rates and system maintenance problems.

VI. **U.S.B.R. RECLAMATION REFORM ACT (RRA) FORMS**

- A. U.S.B.R. Reclamation Reform Act (RRA) Forms due March 1, 2014

VII. **KINGS RIVER WATER QUALITY COALITION**

- A. Irrigated Lands Regulatory Program
- B. Tulare Lake Basin General Order Implementation

VIII. **SAN LUIS & DELTA-MENDOTA WATER AUTHORITY**

- A. Membership Assessment

JAMES IRRIGATION DISTRICT

INCORPORATED FEBRUARY 16, 1920

ANNUAL MEETING

AGENDA

Friday, March 14, 2014, 1:00 p.m.

8749 9th Street, San Joaquin, California 93660

Telephone (559) 693-4356

IX. WATER SUPPLY AUGMENTATION PROJECTS INITIATED BY THE DISTRICT

A. Lateral K Basin: Banking/Storage
   1. Report re: funds that have been generated as a result of constructing this facility
   2. Drilling additional wells - Report re: yields achieved as a result of drilling new wells

B. Kings Basin Water Authority - California Department of Water Resources Integrated Regional Water Management Plan / Proposition 84

C. Water Quality

X. POWER SUPPLY ISSUES

A. Power & Water Resources Pooling Authority

B. Pacific Gas & Electric Company

XI. 2014-2015 IRRIGATION BILLING RATES

A. Budget / Rates

B. Water Rate Structure

C. Refund

XII. DISTRICT ASSESSMENTS

XIII. OPERATIONS & MAINTENANCE

XIV. ADJOURN

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX K

DISTRICT SAMPLE WATER ORDER FORM

JAMES IRRIGATION DISTRICT

8749 9th Street, P. O. Box 757, San Joaquin, CA 93660-0757

Phone: 693-4356 Fax: 693-4357

CONTACTS:	HOME	MOBILE
Sample Contact		123-4567

IRRIGATION ORDER / YEAR: 2015

ORDER DATE: _____ TIME: _____ AM / PM

OFFICE _____

FIELD _____

TELEPHONE _____

MONTHLY SHEET

ACCOUNT NAME: **SAMPLE CUSTOMER** ACCOUNT NO. **XXX** TAKEN BY: _____

AREA #	GATE #	2014 CROP	2015 CROP	FIELD #	ACRES IRR	IRR METHOD	START CFS	START DATE	START TIME	COMMENTS	RATE
01	ES-3*	PISTACHIO TRS	PISTACHIO TRS	094608	70	DRIP TAPE	4.0			MONTHLY	117.00
01	H-26*	TOMATOES	TOMATOES	094611	36	DRIP TAPE	4.0			MONTHLY	117.00
01	I-7A*	ONIONS	COTTON	094609	75	FLOOD	4.0				117.00
01	I-8*	COTTON	ONIONS	094610	75	SPRINKLER	4.0			MONTHLY	117.00
					256		16.0				

ORDERED BY: _____ CONFIRMED BY: _____

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

APPENDIX L

BOARD RESOLUTION ADOPTING WATER MANAGEMENT PLAN

RESOLUTION NO. 15-___

RESOLUTION OF THE BOARD OF DIRECTORS OF THE JAMES IRRIGATION DISTRICT FOR THE ADOPTION OF A WATER MANAGEMENT PLAN

WHEREAS, the District has prepared an updated Water Management Plan in compliance with United States Bureau of Reclamation ("Reclamation") Guidelines;

WHEREAS, the Water Management Plan covers the calendar years of 2010 to 2014 and sets goals for the forthcoming years of 2015-2019;

WHEREAS, the local office of Reclamation has reviewed and approved the Water Management Plan;

WHEREAS, the District will make reasonable efforts to meet the established water management goals outlined in the Water Management Plan;

WHEREAS, the Board of Directors believes that adopting the Water Management Plan will be in the best interests of its constituents and water users and can help meet the projected long-term water needs of the James Irrigation District.

BE IT RESOLVED, by the Board of Directors that the District hereby adopts the 2009-2014 James Irrigation District Water Management Plan.

PASSED AND ADOPTED at a regular meeting of the Board of Directors of James Irrigation District on _____, 2015.

_____

(General Manager)

JAMES IRRIGATION DISTRICT

WATER MANAGEMENT PLAN

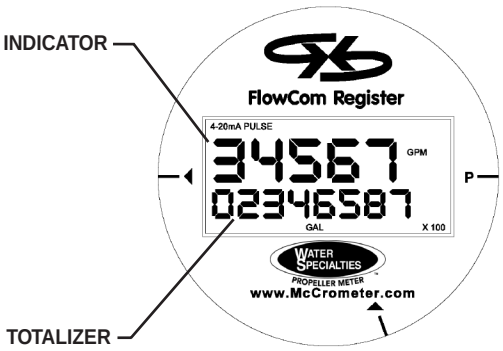
APPENDIX M

WATER METER INFORMATION

WATER SPECIALTIES™
PROPELLER METER

MODEL OF12-D

OPEN FLOW METER
SOLID STATE ELECTRONIC PROPELLER METER
DIGITAL INDICATOR - TOTALIZER
SIZES 10" thru 72"



TYPICAL
DIGITAL INDICATOR-TOTALIZER

DESCRIPTION

MODEL OF12-D OPEN FLOW METERS are designed for accurate metering of ditch turnouts, reservoir outlets, closed conduits or other similar installations. The rigid, light weight construction and simple installation allow easy removal for winter storage or transfer to other locations. The upper mounting plate is equipped with a padlock hasp. The lower bracket has suitable guides for easy installation. An optional revolving mounting bracket, with padlock hasp, is also available. The revolving mounting bracket allows the meter assembly to be raised approximately 2 inches permitting the column to be rotated 180 degrees and easily withdrawn. The revolving mounting bracket is ideal when high velocity flow conditions exist. An optional remote mounting kit with up to 100 feet of cable is available to locate the indicator-totalizer at remote locations.

INSTALLATION can be made to any wall or vertical structure which will center the propeller in the flow measuring area. The meter location must have a controlled flow measuring area and a full flow of liquid for proper accuracy. Fully opened gate valves, fittings or other obstructions that tend to set up flow disturbances should be a minimum of ten pipe diameters upstream from the meter. Installations with less than ten pipe diameters of straight pipe require straightening vanes. Meters with straightening vanes require at least five pipe diameters upstream.

PROPELLER is magnetically coupled with the electronic sensor through the sealed gearbox. This completely eliminates water entering the meter assembly, and eliminates all moving parts except for the propeller. The propeller is a conical shaped three bladed propeller, injection molded of thermoplastic material resistant to normal water corrosion and deformity due to high flow velocities.

BEARING in propeller is a water lubricated ceramic sleeve and spindle bearing system with a ceramic/stainless steel spindle. Dual ceramic thrust bearings, standard on all meters, handle flows in both forward and reverse directions. The bearing design promotes extended periods of maintenance free propeller operation.

DIGITAL INDICATOR-TOTALIZER has a non-volatile EEPROM memory to store totalizer count (updated hourly while running). Features a large two line display. Five digit top line indicates flow rate, and eight digit bottom line provides volumetric flow data. Indicator is available in 22 different units, including GPM, CFS, MGD. Totalizer is available in 20 different units, including Gallons, AF, CF. Units of measurement are user-selectable. Battery life is 6 -10 years. Housing is NEMA 4X rated.

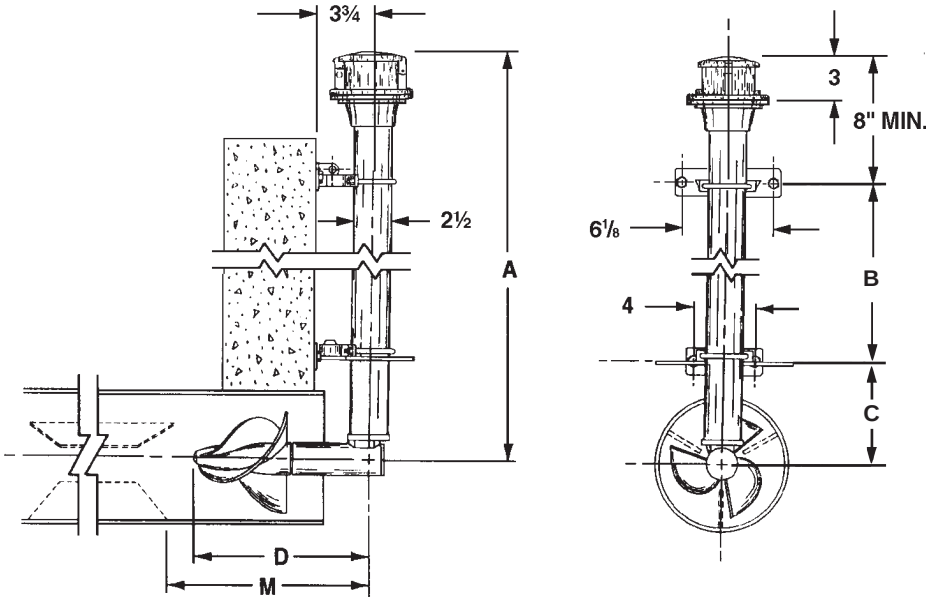
Available with optional 4-20mA and/or pulse output.

SPECIFICATIONS

ACCURACY	Plus or minus 2% of actual flow within the range specified for each meter size.
TEMPERATURE RANGE	140° F Maximum. Consult factory for special construction for higher temperatures.
MINIMUM FLOWS	As shown for each meter size and construction are required for accurate registration. See flow chart.
MAXIMUM FLOWS	As shown for each meter size and construction are rated for continuous operation. See flow chart.
INTERMITTENT FLOWS	As shown for each meter size are rated for 10% to 15% of the total time the meter is operating. Consult factory for High Velocity construction when intermittent flows are higher than shown on flow chart and/or when longer operating periods are required.
MATERIALS	Used in construction are chosen to minimize the corrosive effects of the liquids measured by the meter assembly. PROPELLER MAGNETS - permanent ceramic type PROPELLER BEARING - ceramic sleeve type PROPELLER SPINDLE - ceramic coated stainless steel PROPELLER - injection molded thermoplastic GEARBOX - stainless steel SEPARATOR - stainless steel BOLTS - stainless steel DROP PIPE - bronze METER HEAD - cast bronze MOUNTING BRACKETS -cast bronze
OPTIONAL EQUIPMENT	Includes a remote mounting kit with up to 100 feet of cable, digital transmitter, revolving mounting frame and a wide range of controls and instruments for indicating, totalizing and recording flow data for each meter. Special constructions and materials are available upon request.
ORDERING INFO	Must be specified by the customer and includes: "A" dimension (see back of data sheet) Pipe I.D. Minimum & maximum flow ranges Temperature of meter environment Indicator scale and units Totalizer dial units Type of materials and construction Optional equipment desired

MODEL OF12-D

OPEN FLOW METER
SOLID STATE ELECTRONIC PROPELLER METER
DIGITAL INDICATOR-TOTALIZER
SIZES 10" thru 72"



METER & PIPE SIZE	FLOW RANGES,GPM			DIMENSIONS					SHIPPING WEIGHT POUNDS*
	MIN.	MAX.	INT.	A*	B	C	D	M	
10	300	2000	3000				11½	13½	80
12	400	3000	3500				11½	13½	80
14	500	4000	4500				11½	13½	80
16	600	5000	6000				11½	13½	80
18	800	6000	7500				11½	13½	80
20	900	8000	9000				11½	13½	80
24	1000	10000	13500				11½	13½	80
30	1800	15000	21000				11½	13½	80
36	2000	20000	30000				11½	13½	80
42	3000	30000	40000				11½	13½	80
48	5500	35000	50000				11½	13½	80
54	6500	45000	55000				11½	13½	200
60	7500	60000	80000				11½	13½	200
66	8500	75000	95000				11½	13½	200
72	9500	90000	115000				11½	13½	200

*** NOTE: Model OF12-D meters are equipped with a 6 foot "A" dim. unless otherwise specified.**

**** NOTE: Shipping weights are approximate. Actual weight depends upon "A" dim.**

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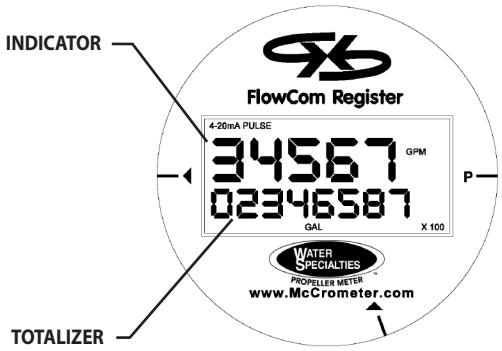
TEL: 951-652-6811 • FAX: 951-652-3078

WATER SPECIALTIES™
PROPELLER METER

MODEL LP32-D

150 psi STRAP-ON SADDLE METER
SOLID STATE ELECTRONIC PROPELLER METER
STAINLESS STEEL STRAP-ON SADDLE
DIGITAL INDICATOR-TOTALIZER
SIZES 6" thru 20"



TYPICAL
DIGITAL INDICATOR-TOTALIZER

DESCRIPTION

MODEL LP32-D STRAP-ON SADDLE METERS are designed for irrigation or other low pressure service up to 150 PSI working pressure. The stainless steel saddle and u-straps permit installation on a wide range of steel, cast iron, plastic (3/16" PVC wall minimum), asbestos, and other pipe materials for each nominal meter size. It is necessary upon ordering to furnish the I.D. dimension of the pipe the meter is to be mounted on, for calibration purposes. The pipe O.D. dimension or wall thickness must also be furnished for proper sizing of the U-straps.

INSTALLATION is made by cutting a hole in the existing pipe line and then attaching the meter securely to the line. U-straps for attaching the meter saddle to the line are furnished with each meter. The meter can be installed horizontally, or inclined on suction or discharge lines. The meter must have a full flow of liquid for proper accuracy. Fully opened gate valves, fittings, or other obstructions that tend to set up flow disturbances should be a minimum of ten pipe diameters upstream and two pipe diameters downstream from the meter. Installations with less than ten pipe diameters of straight pipe require straightening vanes. Meters with straightening vanes require at least five pipe diameters upstream and two pipe diameters downstream. An optional remote mounting kit with up to 100 feet of cable for the indicator-totalizer is available.

PROPELLER is magnetically coupled with the electronic sensor through the sealed gearbox. This completely eliminates water entering the meter assembly, and eliminates all moving parts except for the propeller. The propeller is a conical shaped three bladed propeller, injection molded of thermoplastic material resistant to normal water corrosion and deformity due to high flow velocities.

BEARING in propeller is a water lubricated ceramic sleeve and spindle bearing system with a ceramic/stainless steel spindle. Dual ceramic thrust bearings, standard on all meters, handle flows in both forward and reverse directions. The bearing design promotes extended periods of maintenance free propeller operation.

DIGITAL INDICATOR-TOTALIZER has a non-volatile EEPROM memory to store totalizer count (updated hourly while running). Features a large two line display. Five digit top line indicates flow rate, and eight digit bottom line provides volumetric flow data. Indicator is available in 22 different units, including GPM, CFS, MGD. Totalizer is available in 20 different units, including Gallons, AF, CF. Units of measurement are user-selectable. Battery life is 6 -10 years. Housing is NEMA 4X rated.

Available with optional 4-20mA and/or pulse output.

SPECIFICATIONS

ACCURACY	Plus or minus 2% of actual flow within the range specified for each meter size.
PRESSURE RANGE	Up to 150 PSI maximum working pressure.
TEMPERATURE RANGE	140° F Maximum. Consult factory for special construction for higher temperatures.
MINIMUM FLOWS	As shown for each meter size and construction are required for accurate registration. See flow chart. NOTE: Minimum flow will be higher when auxiliary equipment is added.
MAXIMUM FLOWS	As shown for each meter size and construction are rated for continuous operation. See flow chart.
INTERMITTENT FLOWS	As shown for each meter size are rated for 10% to 15% of the total time the meter is operating. Consult factory for High Velocity construction when intermittent flows are higher than shown on flow chart and/or when longer operating periods are required.
MATERIALS	Used in construction are chosen to minimize the corrosive effects of the liquids measured by the meter assembly. PROPELLER MAGNET - permanent ceramic type PROPELLER BEARING - ceramic sleeve type PROPELLER SPINDLE - ceramic sleeve/stainless steel PROPELLER - injection molded thermoplastic GEARBOX - stainless steel SEPARATOR - stainless steel BOLTS - stainless steel SADDLE - stainless steel LUG STRIPS - stainless steel U-STRAPS - stainless steel
OPTIONAL EQUIPMENT	Includes a remote mounting kit with up to 100 feet of cable, digital transmitter, and a wide range of controls and instruments for indicating, totalizing, and recording flow data for each meter. Special constructions and materials are available upon request.
ORDERING INFO	Must be specified by the customer and includes: minimum & maximum flow ranges, pipe I.D. and O.D. or wall thickness, position of meter (horizontal, inclined), temperature of meter environment, indicator scale and units, totalizer dial units, type of materials and construction, and optional equipment desired.

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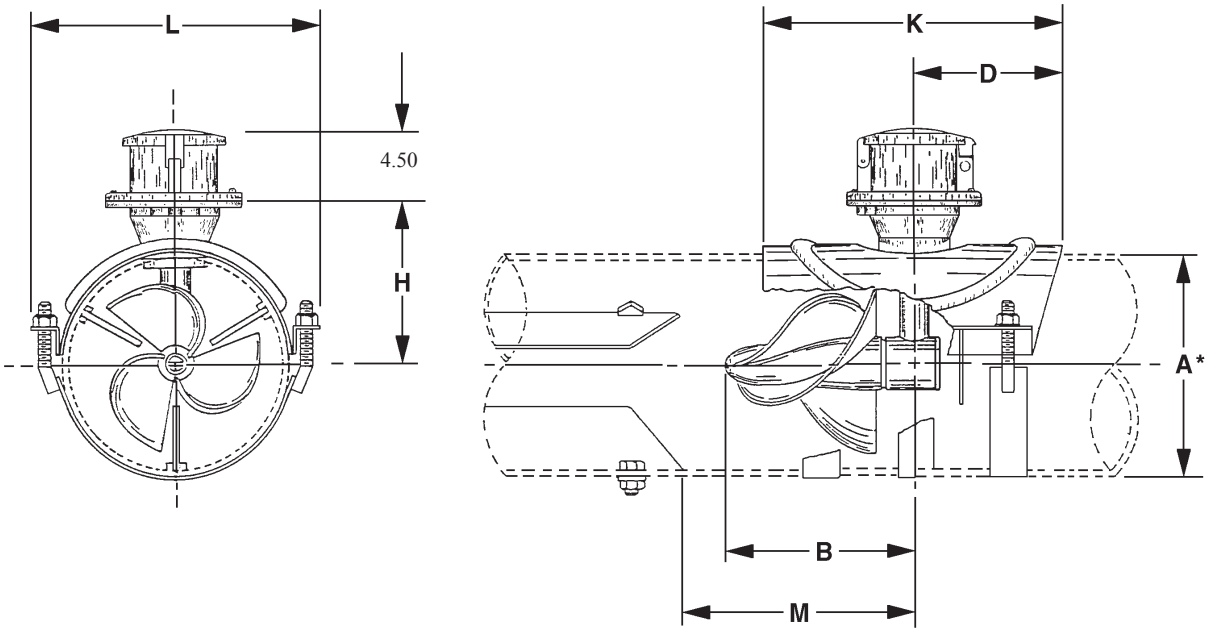

METER & PIPE SIZE	FLOW RANGES, GPM			DIMENSIONS					SHIPPING		WEIGHT POUNDS
	MIN.	MAX.	INT.	A	B	D	H	K	L	M	
6	200	1200	1500	$6^{5}/_{8}$	8	6	5¼	12	13	10	20
8	250	1500	2000	$8^{5}/_{8}$	8	6	6¼	12	12½	10	25
10	300	2000	3000	10¾	8	6	$7^{3}/_{8}$	12	13¼	10	28
12	350	3000	3500	12¾	8	6	$8^{3}/_{8}$	12	15¼	10	32
14	450	4000	4500	14	8	6	9¼	12	15½	10	35
16	500	5000	6000	16	8	6	10¼	12	17½	10	38
18	800	6000	7500	18	8	6	11¼	12	19½	10	43
20	950	8000	9000	20	8	6	12¼	12	21½	10	49

*** PLEASE SPECIFY PIPE I.D. AND O.D.**

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